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[Special Editorial Correspondence.]

THE CONFERENCE BEFORE THE RAILROAD COMMISSION OF WISCONSIN, RESPECTING STANDARDS FOR GAS AND ELECTRIC CURRENTS SUPPLIED BY PRIVATE CORPORATIONS IN THAT STATE.

MILWAUKEE, WIS., March 4th, 1908.

To the Editors AMERICAN GAS LIGHT JOURNAL: A meeting, called by the Railroad Commission of Wisconsin, to consider the standards for gas and electricity, was called to order by Chairman Meyer, of the Commission, at 10 A.M., Tuesday, March 3d, in the Council Room of the City Hall at Madison. There was a large attendance of gas and electric men of this State and elsewhere; also a considerable number of the citizens of Madison and many students from the University.

Chairman Meyer announced briefly the purposes for which the meeting had been called, and asked Prof. Burgess, of the technical staff of the Commission, to give an outline of the work done by the experts of the Commission along the proposed lines of discussion.

Prof. Burgess first took up the question of testing meters, and gave several instances where tests had been made with the results thereof. It seemed from the reported results that the meters of some of the Companies had not been tested as frequently as should have been done.

The Chairman in announcing the presence of Doctor Hyde, of the Bureau of Standards, Washington, D. C., said that before taking up the regular discussions they would be glad to have the Doctor outline some of the work being carried on at Washington, which would be of interest to the Commission and to others interested in its work.

Doctor Hyde talked very interestingly upon the work of the Bureau, stating that efforts were being made to have the Bureau thoroughly equipped with apparatus of all kinds required in the duty of comparing and standardizing all classes of apparatus, that much had been done towards standardizing electrical testing instruments and apparatus, and was getting into the work of gas photometry and calorimetry as fast as possible.

He outlined at considerable length some of the difficulties encountered in the past in harmonizing the different standards used by gas and electric people in determining the units of light. The Associations representing the different types of lighting having recently gotten together, he suggested that any standard for illuminating values of gas and electricity established by the Commission should be based upon a standard unit of light adopted by the Bureau of Standards at Washington, and that instruments used in measuring the illuminating values be compared and standardized with those of the Bureau.

Mr. R. B. Brown, Engineer of the Milwaukee Gas Light Company, outlined to the Commission the method of testing meters carried on by his Company, and also, as Chairman of the committee appointed by the gas companies of the State, made recommendations as to the nature of tests and the degree of accuracy which should be attained. The common practice in this country and in Europe is to consider a meter correct which registers within 2 per cent. above or below the point of absolute correctness. His statements were corroborated by Mr. J. B. Klumpp, representing the Janesville Gas Light Company, and Mr. David Douglas, President of the Eau Claire Gas Light Company.

Mr. A. E. Forstall, of New York, at the request of the Chairman, gave a brief outline of his experience as a member of the Committee appointed by the New York Public Service Commission to prepare a system of testing meters.

The next thing discussed was the standard to be established for calorific or heating value of gas, and the methods of determining same. This brought out a spirited discussion by the experts who had previously discussed meters. In addition, Prof. Sommer, the City Gas Inspector of Milwaukee, gave his experience in the work of his office.

Chairman Brown recommended the adoption of a standard of 600 B. T. U. for a monthly average, with a minimum of 550 B. T. U. at any time. The discussion brought out distinctly the fact that it was an impossibility for any gas company to keep its output constantly at any predetermined standard, and that the variations due to weather conditions and differences in quality of materials used beyond the control of the Company, would cause considerable variation in the output from time to time which must be provided for in any standard adopted.

The discussion also brought out the general impression that the companies of the State, outside of Milwaukee, would have difficulty in reaching a standard of an average of 600 B.T.U. President Douglas, of the Eau Claire Company, was quite emphatic in his statements that it would be exceedingly difficult for his Company, operating under the conditions that it did, to bring the quality of its gas above an

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average of 580 B.T.U. Prof. Sommer, of Milwaukee, stated that the Milwaukee Company ought to operate under a standard of 635 B.T.U., and this was supplemented by statements made by City Attorney Kelly, of Milwaukee, to the effect that the people in Milwaukee would not be satisfied with a standard below the quality of the gas that had been furnished by the Milwaukee Company. Inspector Sommer stated that the Milwaukee Company had been furnishing gas of an average heating value of about 600 to 635 B.T.U.

Vice-President S. J. Glass, of the Milwaukee Gas Light Company, stated to the Commission that his Company had adopted a standard of 635 B.T.U. many years ago, and had consistently worked towards that standard ever since; that when the standard of 600 B.T.U. adopted under the old law by Prof. Fisher was announced, his Company supplied the necessary equipment for the city testing bureau in Milwukee; that afterwards, when Prof. Fisher changed the standard from a so-called gross heating value of 600 B.T.U. to a net heating value of the same quantity, which would be equivalent to about 670 B.T.U. gross, without notice to the gas companies, his Company felt that such a change was an injustice, and as the standard thus established by Prof. Fisher could not be reached by his Company, it was decided to ignore it and continue to furnish gas of the same quality that had been furnished for many years; and that if the present Commission should adopt a standard of 600 B.T.U., the Milwaukee Gas Light Company would still continue to furnish the very best gas that it could make with its plant, believing that it was as much to the interest of the Company to supply a high grade of gas as it was to sell it at the lowest price possible.

The discussion as to whether the standard should be a gross or net heating value was unanimously in favor of gross heating value, Prof. Sommer aptly expressing the sentiment of all the gentlemen discussing the question when he stated that the Company was entitled to all of the heat units in the gas, and that there was no reason for deducting any portion of that heating value on account of inefficiency of the apparatus in which the gas was used.

Then the question of pressure was considered. It was the unanimous opinion of all the experts discussing the question that greater efficiency and better results generally were attained by higher pressures, contrary to the general belief that high pressures caused wastefulness. It was generally recognized that high pressures resulted in more perfect gas combustion, and, in consequence, a lesser volume of gas or the burning of the same quantity was required during a lesser period of time to accomplish any given result. It was recognized that it would be difficult for the smaller companies to reach the higher pressures commonly used in the larger cities. The discussion brought out quite forcibly the fact that a large proportion of the complaints of poor gas was due to variations in pressure rather than to a change in the quality of the gas furnished.

The recommendations regarding pressures varied, from a minimum of 1½ inches of water pressure, equivalent to a trifle over 1½ ounces of pressure per square inch, to a maximum of whatever amount might be necessary to supply the outlying districts.

Engineer Brown, of the Milwaukee Company, gave an interesting illustration of the difficulties encountered in distributing gas at the comparatively low pressures ordinarly used, citing an instance in connection with the standard established by the old Utilities Commission in New York State. That Commission established a standard of pressure for New York city of a minimum of 1 inch water pressure and a maximum of 2½ inches water pressure. The difference in pressure due to elevation is an increase of almost 1 inch for each 100 feet of increase in elevation. and as some portions of New York are nearly 200 feet higher than others, it could be easily seen that the allowable variation of 1½ inches would be more than absorbed by the difference in elevation of the mains, to say nothing of the elevation due to height of buildings. As a further illustration of some of the difficulties in New York, he cited figures made by President Humphreys, of the Stevens Institute of Tecnnology, in connection with this same standard. It was well known, he declared, that the friction of gas passing through the pipes rapidly reduced the pressure, and that in order to deliver gas at any certain pressure at the end of the main or at some distance from the works, the pressure at the works must be very much higher than the pressure required at the other end of the main.

President Humphreys' calculation showed that if all of the gas being used by the people of New York at the hours of minimum consumption was being delivered at the end of a 48-inch main, with an initial pressure of 2½ inches, the gas could be transmitted through a main of that size for a distance of 13 miles with a pressure at the further end of 1 inch, the friction of the gas in the main absorbing the allowable difference provided by the Commission of 1½ inches. If the gas being consumed during the maximum consumption period was being put through the same sized main, the quantity would be so large, and the drop in pressure so rapid in consequence, that the length of that sized main required to absorb the allowable difference of 1½ inches would be less than 40 feet.

All of the discussions were of an exceedingly interesting character, due to the fact that Chairman Meyer, of the Commission, had requested that the discussion should be by experts or others capable of discussing the subjects from scientific standpoints, and as the gentlemen taking part in the various discussions were all experts in the several lines, it made the meeting of a very interesting character to those present, and particularly to people familiar with the subjects under discussion. At the next session the subject of electric standards will be taken up.—MILWAUKEE.

[OFFICIAL REPORT.—AS FURNISHED BY THE SECRETARY.—CONTINUED FROM PAGE 356.]

THIRTY-EIGHTH ANNUAL MEETING, NEW ENGLAND ASSOCIATION OF GAS ENGINEERS.

HELD IN YOUNG'S HOTEL, BOSTON, MASS., FEB. 19 AND 20, 1908.

FIRST DAY—MORNING SESSION.

COMMITTEE ON PRESIDENT'S ADDRESS.

Vice-President Africa appointed as the Committee on the President's address Messrs. William E. McKay, W. A. Wood and W. A. Learned. The President took the chair and called for the

REPORTS OF THE SECRETARY AND TREASURER,

which were read by that officer as follows:

Report of Treasurer.

Cash on hand January 1, 1907	$78.10	
Received for dues, '08	5.00	
" " " '07	880.00	
" " " '06	35.00	
" " " '05	10.00	
" " admissions	40.00	
" " dinner tickets	592.00	
" " reports of meeting	135.92	
" " sale of books and papers	19.00	
		$1,795.02
Paid for library	$114.61	
" " postage	9.45	
" " telegrams	1.45	
" " printing	218.35	
" " illustrations	19.06	
" " flowers	56.25	
" " express	.80	
" " typewriting	5.00	
" " music	35.00	
" " hotel expenses	664.95	
" " reporting meeting	128.36	
" " salary	300.00	
Balance cash, December 31, 1907	241.74	
		$1,795.02
Cash on deposit, Columbia Trust Company		$241.74
" " " East Boston Savings Bank		350.18

Examined and found correct.

Signed, JOS. E. NUTE, BENJ. J. ALLEN, Auditing Committee.

N. W. GIFFORD, Treasurer.

On motion of Mr. Nettleton, the report was accepted and ordered placed on file.

Report of Secretary.

The Secretary—As Secretary I would report as follows:

To the members of the New England Association of Gas Engineers: At the last annual meeting there were added 6 active members and 5 associate. There has been lost by death, resignation and failure to pay dues 26, leaving the names of

Honorary members	5
Active "	134
Associate "	81
Total	220

on the list, February 1, 1908.

During the year the "Proceedings" for years '06 and '07 have been printed and will be issued in bound volume, together with report of this meeting, as soon as possible.

There have been added to the library the following volumes:

"Municipal Ownership;" Porter.
"Practical Illumination;" Cravath.
"Gas Engineering;" Latta.
"Facts about Pipe;" Converse.
"Finances of Gas and Electric Light and Power Enterprises;" Marks.

Respectfully submitted, N. W. GIFFORD, Sec'y.

The President—You have heard the Secretary's report, Gentlemen. If there is no objection it will take the same course as the Treasurer's report did. Correspondence, Mr. Secretary, if you will read it.

ACKNOWLEDGING THE CORRESPONDENCE.

The Secretary—I have received quite a batch of correspondence, fortunately some accepting and following up the acceptance with their attendance here, and unfortunately some regrets. A letter from Col. Benson perhaps I might read:

No. 79 Wilson Street, Brooklyn, N. Y., Feb. 14, 1908.

Mr. N. W. Gifford, Secretary New England Association of Gas Engineers, East Boston, Mass.—My dear Mr. Gifford: Your cordial invitation is at hand to be present at the meeting of the Association next week, and which I promised myself the pleasure of accepting and of meeting so many of my old and valued friends in Boston. But I find myself at the last hour reluctantly compelled to send regrets, from the fact of being compelled to fill an engagement out-of-town on the date of your meeting.

Please remember me very kindly to all inquiring friends, to express my thanks for your kind invitation, and to wish you to have the most pleasant and instructive meeting in your remembrance.

Yours very truly, Fred. S. Benson.

Also, one from New Haven:

212 Orchard Street,
New Haven, Conn., Feb. 17, 1908.

Mr. N. W. Gifford, Secretary, New England Association of Gas Engineers—Dear Sir: I am in receipt of your invitation to attend the annual meeting of the Association, on Wednesday, Feb. 20. It would afford me great pleasure to meet my old associates once more, but I am detained at my home by an attack of grippe. With best wishes for a successful and instructive meeting, and kind regards for all my old associates in attendance, thanking you for the invitation, I am, very truly yours, F. C. Sherman.

There are also regrets from Messrs. A. E. Boardman, George F. Goodnow, Edward Daniell, Wm. R, Beal, Alonzo P. Ewing, Thomas E. Byrne, Alfred E. Forstall, Chas. H. B. Chapin, Lewis Lillie and others.

Nominating Committee.

The President—If any member would like to hear any of the letters that the Secretary left unread, we would be glad to have an expression. At this stage of the proceedings I will appoint the following Committee for Selection of Officers for the year ensuing: Messrs. Waldo A. Learned, Charles F. Prichard and Samuel J. Fowler. They will at their discretion present a list for the coming year. The general business will be covered by something that the Secretary has in hand. Mr. Secretary, will you read that? Then we will get the expression of the Association on the measure.

General Business.

The Secretary—The following is a matter of public interest, somewhat aside from our direct line, but you are probably all interested in it:

"We have been actively interested for some time in the efforts which have been made to have Congress pass bills to provide for the establishment of national forest reservations at the headwaters of navigable streams having their source in the Northern or Southern Appalachian Mountains. The situation with respect to the water powers in these regions is constantly becoming more serious as a result of the direct effect which forest devastation has on the uniformity of the flow of these streams. We inclose you herewith some circulars which have been distributed and which give the situation concisely from certain points of view.

"The bills now before Congress for this purpose provide for the expenditure by the National Government of $3,000,000 to establish forest reservations. The bill last year passed the Senate without a dissenting vote and passed the House Committee on Agriculture unanimously, but the Speaker would not allow the bill to be placed on the House calendar so that it would come up for a vote. The Committee on Agriculture for this present Congress has been changed by the Speaker, and as it was organized recently, before the public hearing given on this question, was quite strongly against the passage of the bill. On January 31st, in Washington, before the Committee on Agriculture, a public hearing was given and a very strong case presented to the Committee. At this hearing it was very positively shown that the business interests of the sections of the country affected were seriously concerned in the establishment of these reservations. The situation has now reached the stage where it is important that as much outside influence as possible be brought to bear, particularly from the business interests of the country, and with this in view we desire to have you, if possible, without undue trouble, have prominent interests in your section write to their representatives in Congress, urging a consideration of this matter.

"It has been asked why the States directly affected should not make provision themselves for such reservations. In many instances, such as Massachusetts and South Carolina, all the large streams upon which manufacturing industries have been established have their headwaters in other States, and consequently the means of remedy is without these States' jurisdiction. The problem is, therefore, interstate in its nature, and consequently requiring Congressional action. Further than this, it is one of national importance, inasmuch as Congress yearly appropriates millions of dollars for dredging the navigable streams and the harbors into which these rivers flow, and such dredging is largely due as a result of the destruction to the forests. The problem is also one deserving national consideration because Mr. Gifford Pinchot, United States Forester, has conservatively estimated that the supply of timber, at the present rate of consumption, will last only from 25 to 30 years."

A set of resolutions accompanies this.

Resolutions on Forest Preservation.

Whereas, The New England Association of Gas Engineers recognizes that water powers are of great and rapidly increasing importance to the community at large, and particularly to the engineering interests of the country; and,

Whereas, The value of water power is determined in great measure by regularity of flow of streams, which regularity is seriously impaired by the removal of forest cover at the headwaters with the resulting diminution in the natural storage capacity of the watersheds, this impairment frequently being permanent because of the impossibility of reforestation, owing to the destruction of essential elements of the soil by fire and its loss by erosion; therefore,

Be it Resolved, That it is the opinion of the New England Association of Gas Engineers that the attention of the National and State Governments should be called to the importance of taking such immediate action as may be necessary to protect the headwaters of important streams from deforestation, and to secure, through the introduction of scientific forestry and the elimination of forest fires, the perpetuation of a timber supply: and further,

Be it Resolved, That a copy of these resolutions and the vote thereon be forwarded to each of the New England representatives in Congress.

Mr. Nettleton offered the resolutions for adoption. [Seconded.]

The President - It is moved and seconded that the resolutions as read by our Secretary be adopted by this Association. [Adopted, one dissenting vote.] If there is any general business that any member would like to present at this time, now is the opportunity. If not, we will proceed to the reading of the papers, but if there is any general business now is the time. No general business appearing under the time given, we will proceed to the first paper. Mr. Gardiner, it will be with pleasure that we will all listen to your paper. We know before you start that it will be of interest to all of us.

Mr. W. H. Gardiner, of New York, then read his paper entitled

THE "READINESS TO-SERVE" COST OF GAS SUPPLY,

prefacing it by saying: Mr. President and Gentlemen—Before starting to read this paper I want to say I hope you will overlook any questions referring to rates, and center your attention on cost phases dealt with in the paper. Don't consider it in any way as a rate paper, but merely as a cost paper, possibly underlying rates.

[For the text of the Gardiner paper, see Journal, March 9th, p. 398.]

Discussion.

The President—We have listened to a very interesting paper, and one seemingly that Mr. Gardiner has given considerable thought to. It will be valuable to hear what some of our members have to say on this subject, especially those who have given some little thought in the past to it. We have with us Mr. Walton Clark, and we would be delighted to hear what he has to say in the matter.

Mr. Walton Clark—I read this paper prior to coming here. I have not endeavored to analyze it, but I sympathize with the general principal and the ultimate conclusion, that the charge for selling gas should be based somewhat on the quantity we sell and somewhat upon the times and the way in which it is used—not the purpose for which it is used, but the hours of use. I went into this subject a little many years ago, but not nearly as far as I might have, as the electricians have gone into it and as Mr. Gardiner has gone into it. I see no real difference between the electrical and the gas situation with reference to this question. Perhaps it has not to do with this question; but I want to say a few words about holder capacity. I note that Mr. Gardiner figures his holder capacity on one day's maximum output. That has not seemed to me a reasonable way, and I like better to figure, not on the three maximum days, but on the maximum three days' consumption in determining what holder capacity should

be for a plant. It is not enough to have a holder that on your largest day will leave you at 11 o'clock P.M. with a sheet or two left; you must be prepared for the next day's demand. In my experience I have had three continuous days of almost the same output, those being the maximum three days of the year. A man may be sufficiently provided with storage capacity for one day, and yet find that, at the end of three dark winter days, he is in danger of having to cut his pressure.

The President—We are obliged to Mr. Clark for his remarks. We have with us to-day Mr. Nettleton, and we would be very glad to have any light thrown on this subject by him. Mr. Nettleton.

Mr. Nettleton - I thank you, but I must ask to be excused.

The President - Mr. Slade, of Hartford, who is with us, I think has made some experiments or tried to solve partially the question. We would be glad to hear from him.

Mr. Slade—Mr. President, the whole readiness-to-serve matter strikes me as very interesting from a technical point of view, and not so interesting from a practical viewpoint. As an assistance to a man in analyzing and going over his costs and gas charges there is no question but that careful study of Mr. Gardiner's paper, and other papers along the same line, will be of great assistance, but I can see all kinds of trouble facing the manager who attempts to put into practice a scheme of this kind for general charging, and from which he wishes to obtain his gas revenue. In the first place, there are a number of vital points on which the gas men do not agree among themselves, there are many points where different estimates are made by different engineers, and to ask the public to accept anything of that kind I think would be a pretty hard proposition. The flat, fixed rate for gas is easily understood; the complicated readiness-to-serve method is not. As we consider this matter I am reminded of 2 or 3 companies that I believe have the scheme in effect. I am also reminded of a story I read in one of the papers concerning a lady who entered the gas office to get some information regarding her gas supply. The patient manager very carefully and thoroughly explained the scheme to her three times. On the third explanation she admitted that light had dawned on her, and from her viewpoint all that she had to do to be economical in her gas supply was to be extravagant.

The President—Mr. Gifford, you wanted to ask Mr. Slade a question. Mr. Gifford wants to ask a few questions, Mr. Slade.

The Secretary—I understand Mr. Slade has been making some experiments in his Company at Hartford in regard to differentiation in price. That would be interesting to some of the rest of us, I think.

Mr. Slade—We have had in effect a price list based on monthly use. We start first with a minimum charge of 50 cents for 500 feet or less, then our rate is 95 cents, net, up to 10,000 feet, 90 cents up to 50,000, 85 cents to 100,000, 80 cents to 250,000, and 75 cents up to half a million a month; 70 cents beyond that. We find it works out very nicely and has brought us a large amount of industrial business that we would not have been able to obtain otherwise. I have in mind one single customer who uses 5 to 10 millions a year. We have him in on that basis, and could not on any other.

The Secretary—That is based purely on quantity, not on use?

Mr. Slade—Quantity per month.

Mr. Gardiner—I would like to ask Mr. Slade if that schedule is the block or stop schedule. For instance, does the rate of 85 cents apply merely to a certain block of gas between certain figures, and not over the whole?

Mr. Slade - No; it applies to all the gas—the entire quantity per month. If a man uses over 100,000 the rate is 80 cents.

Mr. Gardiner - For the whole?

Mr. Slade—He would get an $80 gas bill. The minimum charge is wiped out, of course. Do you mean whether we charge 95 cents for the first 10,000, and then 90 cents, and so on?

Mr. Gardiner - Yes.

Mr. Slade - No; we make the entire quantity at one rate.

Mr. Gardiner - Under those circumstances it seemed to me that a man by burning a little more gas could pay a little less for it.

Mr Slade - Precisely. Unfortunately that is true whatever division you make. Of course, if you block it, as you suggest, matters are complicated somewhat; but we have had no trouble from that source.

Mr. Gardiner - I have used block schedules and have not been able to find any additional complication in them.

Mr. Slade—It is a little harder to make up your bills and do the bookkeeping end of it.

Mr. Gardiner—Not if you tabulate the rate.

The President - We are much obliged to you, Mr. Slade. Is there any other gentleman who would like to give his opinion or express his views? Mr. Barnes, have you anything to say from Cambridge in the matter of extra charge, or of readiness-to-serve charge? We shall be glad to hear from you.

Mr. Barnes - I have had no opportunity to study this paper thoroughly. It is interesting and very ingenious, and I agree that on the basic principle it is all right; but I think, with the gentleman from Hartford, and others who have spoken here, that if we undertake to introduce any such system as this in the gas business we are going to have an endless amount of trouble. Unfortunately for us, I think, a great many of the consumers of gas or a larger proportion of the consumers of gas than of electricity, are people to whom you cannot explain so readily this question of "readiness-to-serve" and "load factor" cost, and that is where we should be up against it pretty hard. The principle undoubtedly is all right, but the question of the practicability of it is quite another thing, it seems to me. It involves a good deal of consideration and of careful study.

The President - Before we close the discussion, do you want to add anything, Mr. Gardiner?

Mr. Gardiner—The point brought out by Mr. Slade, of the use of a quantity-increment system, reminds me of an electric case which I have recently been reviewing, where a quantity-increment system was in effect. Very large discounts were obtained by users of large quantities of electricity, but those users of large quantities of electricity did not pay their way. We would have been better off if we had not had them on the books of the company, for the reason that they used their very large quantity in a very short time. Let us assume that some gas company is unfortunate enough to have a very large producer gas plant on its mains, and that they start that plant up every day with our gas supply, and use many thousands of cubic feet in but 15 minutes. Under a quantity-increment system they would get a large discount for that, perhaps, and yet we would have to put mains in their vicinity in order to meet that momentary demand, which in cost would very much more than offset any revenue that we would get from that consumption on any consumption basis of charging. I have been very much impressed with the line the discussion has taken. I will admit that it was somewhat of a surprise to me to find here that the principles of the readiness-to-serve system, the cost of being ready to do a thing first and then the cost of doing it, are so generally accepted in the gas business as well as in the electrical business. The great fear in the gas business seems to be the difficulties of putting the thing in effect. We have in the gas business an entirely different class of customers, to a large extent, from those one has in the electrical business. The way the thing is met in practice in gas is by having a uniform rate by meter, which anybody can take if they want it - an optional rate by meter—and then we make our discount through the optional readiness-to-serve rate. We get our volume of large business in an optional system, which anybody is at liberty to take if they want it, by charging so much for the demand and so much for the output. By so doing we can get the volume of business that is obtainable only on that basis; we can get and cultivate the long hour burning customer as our electrical competitor does.

On motion of Mr. Africa, the thanks of the Association were extended to Mr. Gardiner for his interesting and valuable paper.

(To be Continued.)

Report of Committee on Uniform Accounting and Depreciation, made to the New England Association of Gas Engineers, at the Boston Meeting, Feb., 1908.

To the New England Association of Gas Engineers: In accordance with instructions accompanying its appointment, your Committee presented, at the convention of the American Gas Institute, held in Washington during last October, a communication regarding Uniform Accounting and Depreciation, and therein suggested the appointment by the Institute of a committee to consider these matters. The full text of this communication appears in the "Proceedings" of the Institute.

In accordance with a motion then passed, the Technical Committee of the Institute has appointed the following Committee on Uniform Accounting: R. A. Carter, Chairman, W. A. Baehr, R. Grant, A. S. Cook, A. P. Lathrop, C. W. Curran, C. F. Prichard, S. J. Glass, H. L. Rice.

We understand that the above Committee has been in conference with a similar Committee of the National Electric Light Association, and that these Committees jointly are co-operating with representatives of the Public Service Commissions of New York. We have

reason to entertain the hope that there will result a system and classification of uniform accounts which will be a marked advance in the art. But as your Committee has not been advised in detail of the trend of these conferences, it is of the opinion that it would be untimely for it to now complicate this situation by at this time presenting anything of a definite and detailed nature on the subjects of Uniform Accounting and of Depreciation. However, a general statement of certain basic theorems seems to your Committee to be not inopportune.

Among many very valuable and pertinent suggestions and criticisms in his paper addressed to you on these subjects last year, Dr. Humphreys made two statements which go to the heart of the situation. On page 26 he said: "The fact is that no fair comparison can at present be based upon the surface indications of published reports."

And again, on page 28, he said: "Our books should show the facts, and should show them on their face without need of straining for interpretation."

General uniform accounting is desirable, not only for purely operative businesss reasons, but as a mutual protection to the capital values of unallied properties throughout the country. The recent course of public opinion, legislative action and jurisprudence has shown that very great and irretrievable injury may be, and in instances has been, done our industry (and through it the public interests it touches), merely by biased and false comparisons of partial facts. This entire set of conditions is in reality possible only because partial facts or selected facts were used, while all modifying facts were either unobtainable or were not presented.

Accounting is a means to several ends. Its primary purpose is to register and exhibit in more or less detail all receipts and disbursements. All systems of accounting must safeguard and satisfy this end. This is strictly a matter of "bookkeeping" and auditing. The second purpose of accounting is to exhibit all the sources of all receipts, and all the ends to which they are applied, with relation to the real facts and conditions of any particular business, and in such a manner as to best guide its owners and managers in its conduct. This second purpose is not only a matter of bookkeeping but is also and to a much greater degree a managerial problem. If these two purposes are efficiently and satisfactorily met in any specific or individual enterprise, the accounting thereof may be entirely adequate when viewed solely from the isolated or individual and internal standpoint.

But uniform accounting seeks to play a much broader role. In uniform accounting not only must the two purposes of accounting above defined be satisfied for each and every plant or undertaking submitted to it, but also it must do this by a system and classification of accounts which makes each undertaking, and each item of the accounts of each undertaking, soundly comparable with other similar undertakings in total and in detail.

The special purposes of uniform accounting are, first, to supply means to the owners and managers of analogous enterprises to soundly compare individual situations, methods and results; and, second, to furnish a sound and comprehensible basis on which to give publicity thereto for whatever purpose or through whatever channel it may be desirable or necessary so to do. There are in existence today a great variety of systems of uniform accounting. These many systems seem to be widely different in principles, practices and details. They range from a degree of simplicity amounting to crudity to a complexity and thoroughness which some think unnecessary and confusing.

Having studied in detail quite a number of these systems, including those exhibiting the most marked difference, your Committee has come to the conclusion that it would be a grave mistake, not free from danger, for the gas industry to adopt any system which would fall short of showing all pertinent facts, and showing them on their face, without the need of straining for interpretation. In other words, what we want is a system of uniform accounting which, in so far as possible, will show individually and collectively the facts, all the facts and nothing but the facts. We believe that from this standpoint should be judged the system and classification for uniform accounting which we presume will be published within the year. We take this stand for thoroughness and, where officially necessary, for complete publicity, because of our belief that under proper conditions external to it the gas business has no fear of having all its facts made public, but rather may be seriously injured by not being thoroughly understood.

On the other hand, we do not want necessarily to be understood as indorsing the theory of complete and indiscriminate publicity In accordance with the views expressed by two committees on public policy during the last year, we believe that enforced publicity of accounting would be a grievious wrong unless accompanied with adequate protection from our actual and our potential competitors. And we would further enlarge upon this idea by calling particular attention to the dangers and injustice to which companies not thus protected are subjected, by having incomplete reports, which are not self-explanatory, made public and given an official standing. Indeed, here a little knowledge, an incomplete knowledge, is a very dangerous thing. The art of uniform accounting is at present being stimulated by the fact that several new State commissions for the regulation of public utilities are, by the laws which created them, obliged to put some such system in effect. While we may expect an extension of this movement, it is not free from elements of very grave danger to the progress of the art of accounting.

As an illustration, the Wisconsin Public Utility law, after providing for uniformity of accounting and of forms as to be prescribed by the Commission, uses the following language:

"SECTION 1797, m — 13. No public utility shall keep any other books, accounts, papers or records of the business transacted than those prescribed or approved by the commission."

The situation in New York, and with the Interstate Commerce Commission, is similar to that in Wisconsin. It is right and proper that the books of first entry of a company operating under State supervision be kept as prescribed by the State authorities, and that the sworn returns to said authorities be made from such books thus kept. Presumably the intention in prohibiting the use of other or "unapproved" accounts, memoranda, etc., is to minimize the possibility of secret and evasive accounting. This end would be as well met by merely requiring that the existence and identity of each and all accounts, memoranda, etc., not provided for and approved by the State authorities, be registered with the latter, and be at all times open to their inspection.

There are two obvious objections to prohibiting without latitude the use of supplementary accounts. First, it will impede the progress and development of the art of accounting (and of management) by constricting it within officially sanctioned channels. Second, it will work a great hardship upon those undertakings which have use for a more detailed or a different classification of accounts. Because of the limitations and peculiarities of human nature, we cannot reasonably ever expect that we shall eventually have a system of uniform accounting entirely satisfactory to all concerned. Some will always want more detail, while others ask for greater simplicity; some will want a change of system, while others deny the propriety of such change.

In promulgating a system of uniform accounting we might seek to make it on the average as generally acceptable as possible by having it representative of average conditions, of average conceptions, of the average state of the art. Then some would have to level up to it, but others would have to level down, as in Utopian socialism. Levelling down is always wrong. What we want is levelling up.

What your Committee hopes for is that a system of uniform accounting will be forthcoming, and will be adopted, which will be based on the soundest and most advanced proven theories and practices of bookkeeping and management, which system in, perhaps, a series of steps can be scaled down to meet the requirements of the more simple situations. We wish to emphasize the point that such a system must be not only sound, comprehensive and clear as bookkeeping, but also it should reflect, in a high degree, the real managerial conditions under which the business is conducted.

A system of uniform accounting for the gas business should best be not only sound within itself, but also, in so far as possible, be constructed on the same lines as those used in other public utilities, and *vice versa*. The main reasons for this can be stated under two headings. First, many gas companies are operated in conjunction with electric light undertakings, many electric light companies also operate traction properties, and there is a large and ever increasing number of companies operating all three of these public utilities. Second, all of these utilities are coming more and more under public supervision, and more and more under the supervision of one rather than two or more boards of State Commissioners. The desirability is evident under these conditions of having not only harmony in methods of bookkeeping, but also that the bookkeeping exhibit comparative management as between all units of public service enterprises.

Your Committee has studied in detail the tentative system of uniform accounting, reported last June to the National Electric Light Association, and also the "Standard Classification of Accounts," reported last April by the American Street and Interurban Railway Ac-

countants' Association. The Electric Light Classification, which was quite elaborate, can, perhaps, be best characterized in the words of the Chairman of the Committee which devised it. He said, "Let me say * * * that the Committee confined itself purely to bookkeeping operations. We did not go into the question of cost or any such related matter."

In discussing this report, at the electrical convention in Washington, the President of the American Street and Interurban Railway Accountants' Association, in taking issue with the principals on which the electrical classification was built, said in part:

"The Street Railway Association has built up its system of accounts on the lines of maintenance, operation and transportation. Where the two lines—railway and light—touch and are coincident, is in maintenance and operation. Your [electric light] committee has built up its report on the basis of generation and distribution, so that our premises are wide apart."

The suggestion carried in the above quotation seems to your Committee to be worthy of most careful consideration, not only because maintenance and operation are logically separable from transportation, or production and delivery, but also because the Street Railway Association's classification of accounts has been adopted by the Interstate Commerce Commission, and every State in the Union, excepting only Massachusetts.

While, undoubtedly, most of the discussion of any new classification will center around the "operating expenses," still questions of maintenance, depreciation, renewals, replacements and substitution of equipment and extension of equipment deserve very careful analysis and treatment. But for the reasons outlined at the beginning of this report your Committee has refrained from any present detailed discussion of them in this report. We would, however, call attention to the action of the Interstate Commerce Commission in insisting that, after July 1, 1907, all interstate steam railroads make periodic allowances for depreciation. In view of this situation, as a whole, your Committee would suggest for your consideration and action either that it be now discharged or that it be continued for a year, with such changes or additions in its membership, if any, as may seem wise, in order that it be ready to act as developments during the coming year may prompt. Respectfully submitted,

W. H. GARDINER, Chairman,
J. J. HUMPHREYS,
EDMUND CATHELS,
} Committee.

Dessau "Verticals" in Comparison with Other Systems, More Especially "Slopers."

By MR. ERNEST KÖRTING, of Berlin, in *Journal of Gas Lighting*.

At the Mariendorf Gas Works, the new vertical furnaces with 84 retorts, equal to about 1,225,000 cubic feet per day, have been in action now for some time. Alongside of them "slopers" are at work; so that there is every facility for making a comparison of the two systems. Our experience with the verticals is, of course, too short to permit of results in every respect definite, but long enough to furnish data of considerable interest.

Before, however, going *in medias res*, it may be useful to make a few general remarks on the modern development of carbonization, for which the Berlin station is a very good object lesson, as we have there, on different works, old fire bar furnaces with hand labor, horizontal generator settings with hydraulic stoking machinery, "slopers," and verticals—all being in action at the same time, using about the same mixture of coals, and being kept under the same control.

Years ago, when labor was cheap and rich gas for the batswing and Argand burners a necessity, the low heat, hand worked fire bar furnace and a production of (say) 9,500 cubic feet per ton was the rule. The coal formed a more or less thin layer on the bottom of the retort, so that the rake could be passed over it. In the free space above the coal, the gas became superheated, and part of the hydrocarbons were split up, forming naphthaline, pitch, and even a little free carbon; collateral disadvantages being the necessity of scurfing and augering and the loss in ammonia. But as the heats were low, none of these drawbacks was of a serious nature. Things remained stationary for a long time, but at last, through the rising rates of wages and labor disputes, the impetus was given for the invention of stoking machinery and slopers.

Afterwards, the gradually rising price of raw material brought forth the desire to augment the production per ton of coal, which, however, was not attainable without a reduction in heating value and illuminating power, and in consequence only possible after the adoption of the Welsbach burner. The general means of securing a large production per ton are high heats and thin layers of coal. With Berlin coals and horizontal generator settings, we attain by this method as much as 32 cubic meters (11,500 cubic feet) and more.

In the meantime, the collateral troubles—viz., the formation of naphthaline and pitch, the scurfing, the augering, and the diminution and deterioration of ammonia and tar—became strongly accentuated. In quite a different position are the slopers. As labor saving appliances they have the advantage over the horizontals that the coal enters at one end and the coke leaves at the other; that, in consequence no room need be left for the rake, and nearly the whole section of the retort may be filled with coal. It is obvious that for slopers thin layers of coal would mean a great deal of additional labor, not to mention the fact that it is ever so much more difficult to make a small charge as even and uniform as a big one, so that heavy charging has to be adhered to, but the high make per ton abandoned. The other way—very high heats, considerably higher than those necessary for the thin layers in the horizontals—which would lead to a large production of gas, is not practicable because of the rapid destruction of the setting.

As a compensation, the collateral drawbacks of high heats are much mitigated in the case of slopers. I do not know from my own experience, but I dare say that horizontal through retorts with De Brouwer charging and pushing machines, which allow of heavy charges, especially when the gas exit is on one end only, must give similar carbonizing results to the slopers.

If, now, the heating value of the gas from slopers (or through retorts) is found unnecessarily high, and the production per ton too low, we have a simple method of correction. We send blue water gas either into the retort (auto-carburation) or into the hydraulic. Having the above in mind, it may be said with some justification that the slopers can be regarded as the intermediary step or the connecting-link between horizontal and vertical retorts; for in the latter the empty space above the coal, the diminution of which we have noted with the slopers, has entirely disappeared, as the retort is charged to the full capacity. The gas is in consequence even richer than that made in slopers, and ought theoretically to be less in volume as well. But this is certainly not the case; on the contrary, the output of gas per ton seems to be higher.

The explanation of this phenomenon is obvious. It requires a good deal of skill, with coals of ever-changing quality, to fill an inclined retort with a perfectly uniform charge. As soon, however, as there is too much on one spot, it will not be properly carbonized within a given time, causing a more or less serious deficit of gas. This will be still more the case if the retort should not be properly heated from top to bottom, or if the coal in question should be a creeper. The more frequent charging and discharging (every 6 against every 12 hours) may also be made responsible for part of the loss. It may also be assumed that in the verticals some of the aqueous vapors formed by the distillation of coal will be converted into water gas, and so add to the output. The phenomena which I have called collateral drawbacks of high heats have disappeared with the verticals. There is scarcely any formation of pitch and no naphthaline. The quality of the tar is much improved, and there is more of it into the bargain.

We also have more ammonia in the gas, while the amount of bisulphide of carbon is reduced by more than 50 per cent. The coke is harder and contains less breeze; and last, but not least, if a thin jet of steam is sent into the retort, water gas will be produced, the quantity of which can be varied according to requirements. We are now in Berlin in the favorable position that we have on one works horizontals only, on another slopers, and on a third (Oberspree) verticals. If, therefore, the carbonizing results of these works are carefully controlled, as is certainly the case in Berlin, we shall be able, with some accuracy, to determine the economical consequences of the four different methods of carbonization.

A few explanatory remarks on the following table may be permitted. In order to make the production of (coal and water) gas in verticals comparable with that produced in horizontals and slopers, the quantities of water are added which would bring about equal heating values throughout, though in a medium-sized gas works one would never think of erecting a water gas plant merely for the purpose of producing as little as 6 per cent. on the coal gas thereby. Such a small quantity of blue gas would very likely cost as much as coal gas. The coke figures show the superiority of the hard coke in verticals, whereas the fuel account for retort furnaces proves that the carbonizing in thin layers requires more fuel than the heavy charges (Coze). The boiler-fuel comprises all requirements with the exception of coal and coke handling. It is especially high in the case of hydraulic

stokers, which need considerable power. The fuel used for verticals is responsible also for the water gas produced therein.

TABLE I.—*Economical Consequences of the Four Different Methods of Carbonization.*

	Horizontals.		Slopers.	Verticals.
	Fire-bar.	Generators.		
Coal gas produced per ton of coal	305 c.m.	320 c.m.	305 c.m.	say 320 c.m.
Water gas produced per ton of coal	34 c.m.	19 c.m.	42 c.m.	" 40 c.m.
Mixed gas of 5,220 calories, 585 B.T.U. at 0°C. and 760 mm	339 c.m.	339 c.m.	347 c.m.	" 360 c.m.
Coke produced pr. ct. on coal carbonized, lumps above $\frac{3}{8}$ inch	66 pr. ct.	63.5 pr. ct.	33.5 pr. ct.	" 68.5 c.m.
Breeze produced, pr. ct. on coal carbonized	4 pr. ct.	6.5 pr. ct.	6.5 pr. ct.	" 1.5 pr. ct.
Total coke produced, do.	70 pr. ct.	70.0 pr. ct.	70.0 pr. ct.	" 70 pr. ct.
Tar produced	4.5 pr. ct.	4.5 pr. ct.	4.5 pr. ct.	" 5 pr. ct.
Ammonia produced	2.5 kilos.	2.4 kilos.	2.65 kilos.	" 3.2 kilos.
Coke fuel for retort furnaces, pr. ct. on coal carbonized	24 pr. ct.	14 pr. ct.	12 pr. ct.	" 14 pr. ct.
Coke fuel in boiler furnaces: Exhausters	2 pr. ct.		2 pr. ct.	" 2 pr. ct.
Steam for water gas	....	2 pr. ct.	....	" 1 pr. ct.
Power	....	3. pr ct.	....	....

Assumed Value of Coal and By-Products.

1 ton of coal	$5.00	
1 " coke	4.50	
1 " coke from verticals	4.75	
1 " breeze	1.50	
1 " coke and breeze for boilers	2.50	
1 " tar from slopers	5.00	actual relations.
1 " " verticals	6.25	
1 kilo. of ammonia	0.12	
1 stoker's wages per shift	1.37	

The coke from verticals is, at the present moment, sold at a price which is only 12 cents higher per ton than that of ordinary coke. I dare say it will fetch a better price in time. For broken coke there is no large market in Berlin; it fetches barely the same price as the large sort. As, in consequence, hardly any coke crushing is done, the different amounts of breeze are due to the different methods of handling or the quality of the coke (influence of carbonization). In the case of both verticals and slopers, the coke passes along the hot coke conveyor into a small hopper, from thence into trucks which are lifted and emptied into the large hoppers, which again discharge their contents over rocking sieves into railway trucks. The small stuff falling through the sieves is divided into small coke and breeze (less than $\frac{3}{8}$ inch, or 15 mm. in diameter). The figures for the verticals were found by a 12 days' exact test.

It will be remembered that each vertical retort, before receiving its charge of coal, must take a small quantity of breeze, filling up the bottom of mouthpieces which are too cold for carbonization. The aggregate quantity of breeze used for this purpose is a considerable one, and was, as a matter of course, carefully measured during the trial. It might be expected that all this additional breeze would be got back, and a fair amount of fresh breeze, due to the handling, into the bargain. But in reality there is only a very small amount of breeze recovered, over and above the quantities taken into the house. The question arises, therefore, what has become of this breeze, especially as not much of it is seen when the retort is discharged. The most probable explanation is this: The breeze in the first stage of carbonization gets soaked with tar; it is also partly mixed with coal, and afterwards heated together with the same, being kept the whole time under considerable pressure. In other words, all the conditions are there for making patent fuel (briquettes) out of a large portion of our breeze, which in consequence is recovered in good sized lumps, resembling ordinary coke in every respect.

On the basis of the figures given in Table I., it is possible to calculate the cost of gas into the holder for the different systems. The labor and wear and tear results, which will be afterwards dealt with in detail, may be anticipated.

The comparison made in Table II. is, as a matter of course, imperfect. Local conditions, preconceived ideas, and prejudices will al-

TABLE II.—*Comparative Statement of the Cost Price of Gas (5,220 Calories at 0° C. and 760 mm. or 585 B. T. U. at 32° F. and 30-inch Bar.), Delivered into Holders.*

	Horizontals.						Slopers.			Verticals.		
	Firebars.			Generators with Hydraulic Stokers.								
		Per 1,000 C. Ft.	Per 100 C. M.		Per 1,000 C. Ft.	Per 100 C. M.		Per 1,000 C. Ft	Per 100 C. M.		Per 1,000 C. Ft.	Per 100 C. M.
Coal carbonized at 20 M. per 1,000 kilos	305 c.m.	s. d. 45½ c.	M. 6.55	320 c. m.	s. d. 43½ c.	M. 6.25	305 c.m.	s. d. 45 c.	M. 6.55	320 cm.	s. d. 38½c.	M. 5.55
Coke fuel (retorts) at 18 M. per 1,000 kilos	24 p. ct.	10 c.	1.41	14 p. ct.	.05 c.	— .78	12 p. ct.	.05 c.	— .71	14 p. ct.	.05 c.	—.70
Boiler fuel at 10 M. per 1,000 kilos	...	½ c.	— .06	. ...	.01 c.	— .16	.....	.01 c.	— .06	.....	½ c.	—.08
Purifying materials and wages. Net cost.	....	...	....	.....	....	.....	.....	....	.....	.....	...	.....
Wages: Manipulation— Foremen	....		— .03			—.03			—.03			—.03
Retort house.. Stokers	....		..			—.26			—.24			—.08
Retort house.. Clinkerers	....	.07	1	.....	.03	—.03	.....	.02	—.03	.....	.01	—.03
Retort house.. Scurfers	....		..			—.02			—.02			—.01
Engine drivers, etc	....		— .01			—.05			—.01			—.01
Boilers—Firemen	....		— .01			—.01			—.01			—.01
GROSS COST.	....	63 c.	9.07	.....	52½ c.	7.59	.....	53 c.	7.66	.....	45 c.	6.50
Coke produced at 18 M. 18.50 verticals	66 p. ct.	27½ c.	3.89	63.5 p. ct.	25 c.	3.57	63.5 p. ct.	26½ c.	3.75	68.5 p. ct.	25 c.	3.52
Breeze produced at 6 M	4 p. ct.	½ c.	— .08	5.5 p. ct.	½ c.	— .12	6.5 p. ct.	.01 c.	— .13	1.5 p. ct.	...	—.02
Ammonia (NH^3) at 0.50 M. per kilo	2.50 kil.	3 c.	— .41	2.40 kil.	2 c.	— .38	2.65 kil.	.03 c.	— .43	3.20 kil.	03 c.	—.44
Tar at 2 M. per 1,000 kilos. (Vertical tar, 2.50)	4.5 p. ct.	2 c.	— .29	4.5 p. ct.	2 c.	— .28	4.5 p. ct.	.02 c.	— .29	5 p. ct.	5½ c.	—.35
VALUE OF PRODUCTS.	....	33 c.	4.67	.....	29½ c.	4.35	.....	32½ c.	4.90	....	33½c.	4.33
Net cost of coal gas	305 c.m.	30 c.	4.40	320 c. m.	22 c.	3.24	305 c.m.	20½ c.	3.06	320 c.m.	14½c.	2.17
Water gas, including wear and tear	34 (11 p. ct.)	12 c.	1.72	19 (6 p. c.)	12 c.	1.72	42 (14 p.ct.)	12 c.	1.72	40 (13 p.ct.)	...	.....
NET COST OF MIXED GAS.	339 c.m.	29 c.	4.12	339 c.m.	21 c.	3.16	347 c.m.	20 c.	2.89	360 c.m.	14½c.	2.17
Wear and tear— Retort beds	....	.01½ c.	— .22	.....	1½ c.	— .23	.....	.01 c.	— .15	.....	...	—.08 say
Stokers and sundry tools.	....	.01c.	— .14	.....	1 c.	— .15	.....	½ c.	— .10	.....	.01 c.	—.06 "
	....	31½ c.	4.48	.....	23½ c.	3.54	.....	21½ c.	3.14	. ...	25½c.	2.31

ways have a certain influence even on an engineer who tries his very best to be impartial. Some of the figures are even mere guesswork (as, for instance, the wear and tear of the verticals), but have been admitted after all, as otherwise the object—viz., to show what can reasonably be expected from the verticals in comparison with slopers—would not have been attained. A correction of my figures will have to take place when the experience of years has been accumulated and critically sifted.

Assuming now that our results are fairly accurate, the reader has the opportunity of seeing at one glance what our industry owes to the different improvements, beginning with the introduction of the generator furnace towards 1880, the hydraulic stokers (say 1890), the Coze furnace in 1895, and the verticals in 1907. [The machine worked through retorts are not included in this list; but I presume they will rank about on a level with the Coze.]

Economy due—	Under Present Berlin Conditions—Per 100 Cu. Meters.	Per 1,000 Cu. Ft.
To the generator furnace.. ..... } " hydraulic stoker ..... }	say 0.94 mark.	6½c.
" Coze furnace over the hydraulic stokers	" 0.40 "	3c.
" vertical furnace over the Coze furnace.....	" 0.83 "	6c.
Total.....	2.17 "	15½c.

This is certainly progress. But the whole profit derived from so much strenuous and ingenious work is only equal to 17 per cent. on the selling price of gas. Since 1890, however, the prices of coal and labor have risen enormously—so much in fact, that all our economies are not sufficient to compensate us. We have, therefore, to own to the discouraging fact that we scarcely can, at the present moment, produce our gas at the same price as our fathers did with firebar furnaces and manual labor. In the meantime, the investments in high class plant have become very heavy, while reduced gas prices, higher subsidies to municipalities, and a fierce competition with the electric light, have made heavy inroads into our resources.

Labor.—Nine Coze furnaces form a battery which is worked in Mariendorf by one gang of men, and has almost exactly the same length as seven verticals, which, moreover, produce very nearly the same quantity of coal gas, *plus* water gas—viz., 35,000 cubic meters (1,236,000 cubic feet) per 24 hours. These 2 units are therefore to be taken as the basis of comparison for both the cost of erection and the working results. There are for the 9 slopers, 9 stokers in 24 hours, 3 for each 8-hour shift; whereas for the 7 verticals only 4 men are required, who work in the following manner:

Two men.....	8 hours
Interval without work.....	4 "
Two men..	8 "
Interval without work.....	4 "
Total.....	24 hours

The following table will give an idea of the amount of real work done in each case:

TABLE III.—*Comparison between the Labor which, on the Average of Seven Days, was Necessary for Working Nine Coze* (81 *Retorts*) *and Seven Vertical* (84 *Retorts*) *Furnaces; the Standard being Men-Hours* (*One Man Working One Hour*).

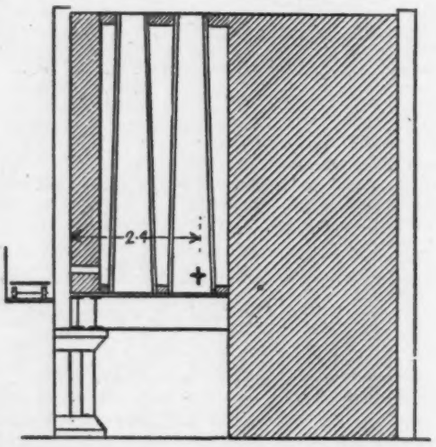
	Coze Furnaces. Men-Hours. per Day.	Vertical Furnaces. Men-Hours. per Day.
Augering.....	13.2	0.5
Discharing retorts.....	7.2	3.3
Charging retorts.....	12.0	3.9
Filling generators.....	3.6	2.3
Sweeping, cleaning, steaming verticals, etc., sundries.....	2.4	4.3
	38.4	14.3
Daily production of coal gas (say).	30,000	....
" " of mixed gas (say)	....	35,000
Per 1,000 cubic meters of gas.....	1.28	0.41

It will be seen that the economy in labor is equal to about 68 per cent. One of the most disagreeable items of retort house work—viz., the augering—has disappeared altogether. It would seem that copious steaming has a beneficial effect in this respect. At any rate, in Mariendorf we need not pass the auger through the ascension pipe (whatever the coal) more than once a week.

Greatly reduced is also the charging of retorts and the filling of generators, and not only in point of time. The men are not nearly so much exposed to heat, either. The discharging of the retorts takes less than half the time, and might be effected much more quickly still if the capacity of the coke conveyor were to be augmented. It consists of merely opening and closing lids, as against the continuous "pricking" from below and pushing from above in the case of the slopers. In other words, the work has become much easier all round. The four men in 24 hours' working seven vertical furnaces have not nearly so much work as the nine men in 24 hours' working nine slopers; and there are also some structural improvements under consideration which promise a further reduction of labor. I dare say that a production of 80,000 cubic meters of gas (2,825,000 cubic feet) with four stokers is within the reach of possibility. This figure means that the labor question on a gas works has been finally settled in favor of the employer.

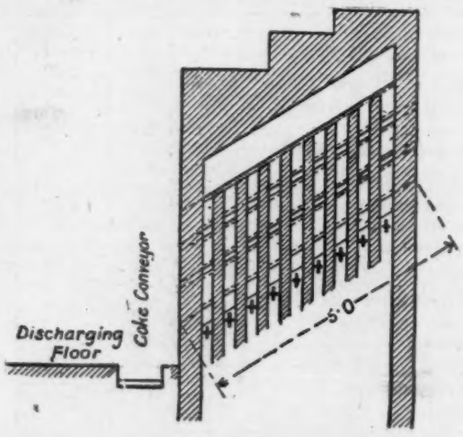
The retort house labor of a stoker comprises in both cases augering, charging and discharging retorts, and feeding the generators; the clinkering of the fires being done by special men.

Supervision.—The vertical furnace, being worked at its extreme



lower end at rather high heats, certainly requires conscientious supervision; and I am afraid that in a great many existing gas works engineers and foremen do not take very much trouble in this respect. The representative of a firm of contractors told me once that if they erect a furnace and bring it into action, the dampers for draught and primary and secondary air being properly adjusted for the then prevailing conditions, temperature, etc., they are frequently called back to that furnace after a year or two, because the results have become less satisfactory. And what do you find? All the dampers have become immovable through rust, etc., because they have never even been touched in the interval.

Now it has always been a tradition with the Imperial Continental Gas Association that nothing pays better than a minute control of the furnace; and I have myself, when a young engineer in Vienna, taken the trouble to instruct a number of young and intelligent workmen in the art of treating generator furnaces. The result was very satisfactory; all of them being now head retort house foremen of our Berlin works. Their reliability is beyond any doubt, and the interest they take in their work, which they have thoroughly mastered, is something marvellous. I know, therefore, from experience, that good control is easily to be procured, if the chief engineer is determined to have it. It is quite another chapter whether the construction of the furnace permits of efficient control and regulation. If, for instance, we look at the section of a Coze furnace, we see a



number of vertical division walls, and between them at + the points where the combustion takes place. It is obviously impossible to see the different flames, to say nothing of measuring their temperatures. But even if the construction of the furnace would allow of leaving holes in the partition walls, it would not be possible to get at them with rods, etc., because there is no room for doing so at the lower end of the furnace, whereas at the top the heat streaming forth would not permit of any handling. In Coze furnaces, therefore, we are only able to see that something is amiss when the retort from the inside shows a white spot, and then it is often already too late.

In the case of the verticals, the point of ignition + is easily accessible to the eye as well as to the regulating tool. The engineer or foreman, lying on a little carriage, which he moves with his foot, can inspect one combustion chamber after the other. Wherever a bright spot is noticed, the pyrometer will be applied and give an absolutely correct indication of the temperature. The remedy is equally simple and carried out within a few minutes. In other words, the Bueb vertical setting is the first furnace in the history of the gas industry permitting an absolutely arbitrary distribution of heat. I like to compare it with a good horse, obeying the slightest touch of its rider.

Wear and Tear.—The wear and tear is, as every gas engineer knows, an important factor in the cost of retort house work. I beg to add a table showing the wear and tear figures for the different Berlin carbonizing plants, the amounts being an average for the past 5 years:

TABLE IV.—*Amount Spent on Wear and Tear per 100 Cubic Meters of Gas Produced.*

	Retort Beds.	Stokers' Tools, Etc.	Hydraulic Stokers.	Mechanical Coke Conveyor.	Narrow Gauge Trucks or Wheelbarrows.	Total.
	Pf.	Pf.	Pf	Pf.	Pf	Pf.
Firebar furnaces	21.9	11.9	...	....	2.3	36.1
Horizontal generators with hydraulic stoking	22.8	9.2	3.5	....	2.6	38.1
Coze furnaces.....	15.4	7.9	....	3.0	....	26.3
Vertical " ...(say)	8.0	4.0	....	2.0	....	14.0

It is interesting to note that the inclined retort beds have oaused 50 per cent. less wear and tear than both horizontal firebars and generator furnaces. With the larger capacity of the furnace, the repairs have diminished. It is not known yet, but only reasonable to expect, that the Coze furnaces will also in this respect form the connecting link between horizontals and verticals. For if, in a vertical furnace, less than a quarter of every retort gets exposed to the full heat—this being the extreme lower end into the bargain, which is easy to repair—it may certainly be hoped that the wear and tear will be considerably reduced. It is the same with the stokers' tools and the hot coke conveyor. The very action of stoking has been done away with, and scarcely any stokers' tools will be required in future. The amount of repairs necessary for the hot coke conveyor will depend to a large extent on the time it is in action. For instance, in the case of the hydraulic stokers, there is all the work for a large number of furnaces concentrated in one pair of machines, which in consequence must be kept going nearly the whole day long. The wear and tear of the hot coke conveyor, which must follow suit, will therefore be considerable. [Assumption of the author, who has no experience in this respect.] The Coze furnaces are discharged at a much quicker rate.

With them the conveyor need only be in action for 11.5 hours out of the 24, whereas the verticals do not require it more than even 3.5 hours; so that they may claim a very considerable reduction of repairs. Altogether, it is very instructive that the larger unit and the much greater simplicity of design and working conditions have so far placed the Berlin Coze furnace in a far better position, in regard to wear and tear, than the horizontal with hydraulic stokers. The verticals are, it may be assumed, another long stride in the same direction. The unit has become much larger still, and so has the simplicity of plant and work. I feel, therefore, entitled to claim for them a similar reduction of repairs.

It may, it is true, be said against this opinion that the bottom mouthpieces of the verticals, which are manipulated by means of cranks, handles and some shafting, are of a less simple description than those of the Coze furnaces. But the shaft for each retort is only in motion for a few seconds every day. If that is bad, what will the defenders of continuous carbonization say, who have to keep the coal feeder and coke discharger at work without interruption? Furthermore, the motion of the lids has become very regular and smooth by the mechanical handling. The gas-tight surface of the mouthpiece is never polluted with thick tar, nor are heavy iron rods being continually passed in and out, as is the case with the Coze furnaces, the retort mouthpieces of which are very roughly handled by the hot and excited stokers. Probably, therefore, the great simplicity, smoothness and cleanliness of the work will cause a diminution of wear and tear also in this case of apparent greater complication.

In this connection, perhaps a remark may be permitted of a general character. It might be thought *a priori* that a modern gas works, with all its labor-saving machinery, would cause an altogether larger outlay on wear and tear than an old-fashioned one. Berlin experience teaches the contrary. For the upkeep of plant we have paid in Berlin, between 1900 and 1904, 20 per cent. less per 100 cubic meters than between 1890 and 1894; but for wear and tear of mains a great deal more. In other words, charges on the production of gas have gone down, whereas those on mains, service pipes, etc., which mean expansion of business, show a large increase.

Retort House and Cost of Installation.—It will be remembered that nine Coze furnaces, with the addition of some water gas, are equal to seven verticals, and that the length of the two different benches is nearly exactly the same. The section through the two retort houses, which have both given much satisfaction in their way, will therefore be sufficient for forming an opinion on their merits and drawbacks. The Coze furnace requires its coal alongside the top of the furnaces and the charging floor below the coal hoppers. In consequence, a rather heavy substructure has to be provided for both purposes. Below the bottom end of the retorts we have the generators, which have to be attended to independently of the carbonizing work. A special discharging floor is therefore indispensable, and must support the hot coke conveyor also. As the steam rising from this has to go right up, the ridge of the roof must be above the lower end of the furnace—thus making the total height rather considerable.

It will be perceived at the first glance that by putting the retort upright the whole construction in much simplified. The coal being kept above the furnace, a very light support is sufficient, and no special charging floor is required. The coke falls directly into the conveyor, thus making a discharging floor superfluous. Roofing is of the very lightest description, and the ventilation is perfect.

I add a comparative statement of cost for both houses, from which it will be seen that the verticals are more advantageous also with regard to the cost of installation.

TABLE V.—*Comparison of Cost between Nine Coze Furnaces with Retorts 4.80 Meters Long (15 Feet 9 Inches) and Seven Vertical Furnaces with Retorts 5 Meters Long (16 Feet), both Inclusive of Retort House.*

	Coze. Marks.	Verticals. Marks.
Iron construction without gable ends and coal bunkers (Coze 108,902 kilos. and verticals 48,010 kilos., at 30 marks per 100 kilos.).....	32,672	14,403
Coal bunkers, at 38 marks per 100 kilos....	12,177	7,400
Discharging floor, including wrought iron floor plates	6,170	....
Nine Coze or seven vertical furnaces, including mountings, etc....	183,347	221,500
Furnace foundations and chimney flues.....	7,900	7,000
Foundations of retort house	2.400	3,900
Chimney.....	6,100	6,100
Bricking-in side walls and floor.....	4,760	4,400
Roofing.....	5,450	3,900
De Brouwer trough	13,500	13,500
	274,476	282,103
Proportionate share of water gas plant.....	30,000	....
" " " naphthaline washer.....	16,000	....
	320,476	282,103
	$80,120	$70,525

Five or Four Meter Retorts.—It is certain that the fifth meter of additional length is, to a slight extent, detrimental to the illuminating power. One would in consequence choose the 4-meter retort wherever high illuminating power is of importance. As soon as this is not the case—in nearly all corporation works in Germany, for instance—I do not see any reason why one should not make use of the

larger capacity granted by the 5-meter retort. In comparing the results attained in different places with 4 and 5-meter retorts, one has to bear in mind that illuminating power production per ton and production per retort cannot reach their maximum at the same time. For instance, when high illuminating power is desired, one has to discharge the retort as soon as carbonization is completed, or scarcely completed—say after 10 hours—and to refrain from steaming too much.

If, on the contrary, one requires a high production per ton, a good deal of steaming is necessary, which, however, is useless without a certain temperature being kept up. One is, therefore, in this case compelled to leave in the charge somewhat longer than is necessary for complete carbonization (12 hours). For the 4-meter retort, under normal conditions, one may therefore claim a comparatively high amount of coal carbonized, coke produced, and gas produced per retort; whereas the 5-meter retort will excel in output per ton and reduction of labor. With regard to the latter item, it is not only convenient to charge regularly every 12 hours, but, by the copious steaming, the heats are so reduced that little or no augering is necessary.

Leaving the illuminating power out of the question, the working methods described as being natural for the two different lengths of retorts may be with profit changed whenever the market conditions require it. When coke is scarce and fetches a high price, one will naturally produce as much of it as possible; while dear coal will induce us to maintain a large output per ton. I add some average figures for both types of retorts—Table VI.

TABLE VI.—*Comparison of Five-Meter and Four-Meter Retorts.*

October, 1907.	Gas {16° C. and 760 mm. Bar. / 59° F. and 30 inches Bar. Production. Per 1,000 Kilos. Cubic Meters.	Per Ton. Cubic Feet.	Per Retort per Day. Cubic Meters.	Per Retort per Day. Cubic Feet.	Illuminating Power; Carpenter Burner, at 16° C and 760 mm. Bar. 59° F. and 30-inch Bar. Candles.	Gas at {0° C. and 760 mm. Bar. / 32° F. and 30-inch Bar. Calorific Power.	B. T. U.
Five-meter retorts	376	13,478	424	44,974	10.80	5,136	577
Four-meter "	315	11,292	398	11,056	17.70	5,613	631

Continuous Carbonization.—The results of the Woodall-Duckham oven so far published do not seem to be very complete and final. Our information about the coal used, production per retort and day, fuel, tar and ammonia is neither so full nor do the figures apparently represent as long a period of uninterrupted working as is desirable. But the figures so far known are very similar to those obtained with the Dessau retort. Mr. Duckham spoke at Liverpool on November 30, 1907, of an average result of 13,021 cubic feet of 14.20-candle power and 546 B.T.U.[1] gas corrected to [?!]; while the October figures for Oberspree were 13,478 cubic feet of 10.80-candle power and 546 B.T.U.[1] gas corrected to 59° F. and 30-inch bar. One cannot, of course, in a small gas works, keep these big furnaces always fully in action; so that for the short periods during which this is possible the results become still more favorable. In the average of eleven consecutive December and January days, for instance, the production per ton was 14,440 cubic feet of gas of 545 B.T.U. (59° F. and 30-inch bar), and the output per retort 15,500 cubic feet. The 5-meter retorts not being favorable as regards illuminating power, we shall have to look to Dessau, where clauses are in force in this respect.

TABLE VII.—*Average Results in Dessau, October, 1907.*

Gas Produced at {15° C. and 760 mm. Bar. / 59° F. and 30-in. Bar. Per 1,000 Kilos. Cubic Meters.	Per Ton. Cubic Feet.	Per Retort per Day. Cubic Meters.	Per Retort per Day. Cubic Feet.	Illuminating Power. Carpenter Burner. Candles.	Gas at {0° C. and 760 mm. Bar. / 32° F. and 30-in. Bar. Calorific Power.	B.T.U.
315	11,292	398	14,056	18.36	5,613	631

Coals used (all quite second rate):

Westphalian	33.1 per cent.
Leverson-Wallsend	28.9 "
New Leverson	38.0 "

The differences are so small that I should think a simultaneous trial with exactly the same coals, testing methods, etc., will be necessary in order to show that the gas results of the one system are a hair's breadth ahead of the other.

After the discussion on my paper during the 1906 meeting of the Institution of Gas Engineers, I said that I could not imagine, from a chemical point of view, why a piece of coal moving slowly through a retort was carbonized to better advantage and under better conditions than a piece remaining stationary during the process. In the first case, the coal would pass slowly through different stages of heat; in the second, different stages of heat would pass over the piece of coal. The effect should be the same. In view of actual results, I do not see any reason to alter my opinion. But if two systems are on the same footing with regard to primary cost, wear and tear, carbonizing results, reliability, etc., I am, on principle and by experience, inclined to prefer the less complicated solution.

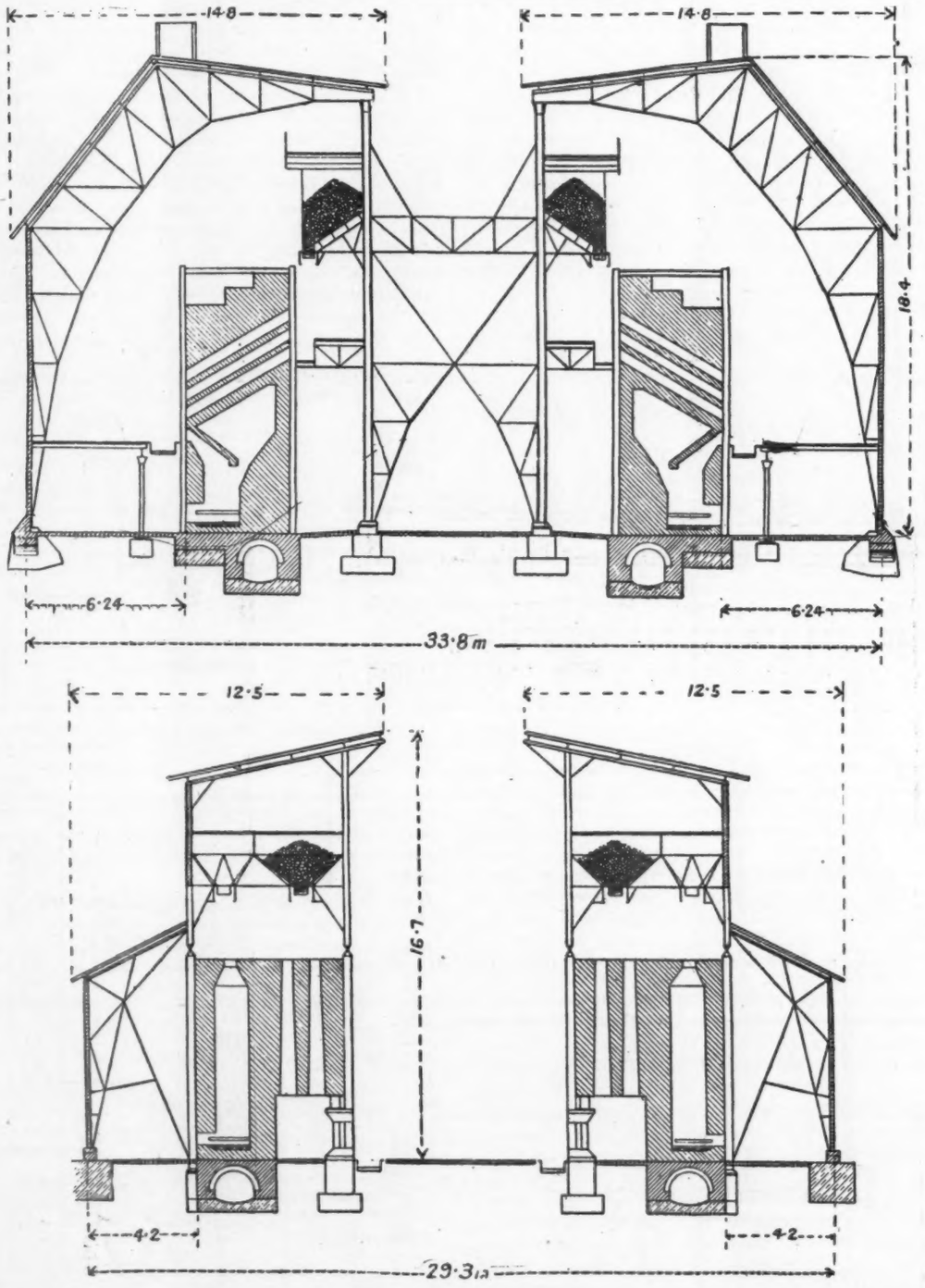
In expressing this view, I will by no means disparage the merits of Messrs. Woodall & Duckham, who with such admirable skill and enthusiasm, have devoted themselves to the old problem of continuous carbonization. No doubt engineers of a mechanical turn of mind will prefer it as doing away entirely with human labor, and the whole gas industry will benefit by the healthy competition of several rival systems.

Standard of Quality for Gas.—A few remarks may be added with regard to the proper standard of quality for gas. In Berlin, about half of the gas sent out is used for other than lighting purposes, and the second half for incandescent burners. There can be no doubt, therefore, that in Germany the calorific value of the gas is of exclusive importance. But I should think that in England also it ought to be considered first and foremost. I dare say that in that country also about half of the total output is used for heating and household purposes, and at least half of the rest for incandescent lighting. In spite of that, the universal standard was, and still is, the illuminating power. Now, at the time when this standard was introduced, only ordinary coal gas was known, and it was a matter of course that, within certain limits, the heating value corresponded to the illuminating power. In Berlin, we regard 570 B.T.U. (59° F. and 30-inch Bar.) as about equivalent to 14-candle coal gas. By the introduction of carburetted water gas, however, the old relation between illuminating power and heating value was altered, this gas showing, for the same illuminating power, a considerably reduced heating value. I dare say that, with one or the other of modern gas producers—viz., verticals, coke ovens, etc.—this discrepancy, which may be due to a very slight percentage of heavy hydrocarbons, will be also found; so that a 14-candle gas is not one in the old sense, but one with considerably less heating power, or with so much less real value to the majority of the consumers. I arrive, therefore, at the conclusion that if the illuminating power as a standard be not given up altogether, it is obviously necessary to introduce heating power clauses as well, in order to protect the interests of the consumers.

The Munich Chamber Oven.—The Munich chamber oven is, according to may idea, bound to be a failure, for the simple reason that its primary cost is prohibitive, at least with gas companies for whom, as a matter of course, economic principles are of first consideration. One furnace for a daily production of 5,000 cubic meters is stated to cost 65,000 marks.

Conclusion.—The foregoing comparison was for me quite a peculiar task, in so far that I had to dwell at length on the shortcomings of those very Coze furnaces for which the late Mr. E. Drory and myself had fought so many times. The question arises, therefore: Have we done right to erect large installations of Cozes, whereas other engineers may have been waiting for the advent of the vertical? The answer must be, as I take it, entirely in the affirmative. The Coze furnaces were, as has been shown by our comparison, a long step in advance, and a step in the right direction, too. The Coze furnaces have in the

1. A curious coincidence.—E. K.



course of years earned large sums of money, and placed us in an excellent position when labor conditions, in consequence of the recent boom, became very difficult. They enabled us, for instance, to introduce the 8-hour day without any additional outlay.

Adhering from the beginning to the principle of large units and simple constructions, we are satisfied with the Coze furnaces, and are, so far, more than satisfied with the verticals, as Mr. E. Drory predicted we should be, when, as almost a dying man, he saw the first trial settings. The vertical furnace for which he declared himself from the beginning with all the enthusiasm of his fervent nature, was the last great interest of his life.

THE Board of Directors of the Union Gas and Electric Company, of Cincinnati, O., as chosen at the stockholders' meeting early this month, is thus composed: A. S. White, George W. Young, Oscar Gubelman, J. T. Carew, A. B. Leach, Norman G. Kenan, Henry L. Doherty, Theodore Clauss, C. H. Rowe, George Heard, Reuben Holden, H. A. Everett, J. M. Gill, M. E. Mock and Olaaf Ussing.

The Dempster and Toogood System of New Rope Driven Stoking Machinery.[1]

With the introduction of the projector type of charging machine and the pusher type of discharging machine, it became necessary to have means whereby the speed at which the machine was being driven could be varied as the charge proceeded, in order that the coal might be spread in an even layer throughout the length and breadth of a 20-foot through retort. To achieve this result, electric motive power was installed to drive these machines, and consequently the application of electric motors in retort houses may be said to be directly due to these machine stokers.

As patentees and makers of this type of stoking machinery, and with the view of meeting the expressed wishes of their clients, Messrs. Robert Dempster & Sons, Limited, of Elland, commenced experiments in their own shops, with the then known methods for obtaining a mechanical variable speed gear of sufficient power. They found that,

1. *Journal of Gas Lighting.*

while it was quite practical to get the variable speed by means of a pulley having an adjustable diameter, two friction clutches were needed to get the reverse motion for the return of the ram, etc. It will be apparent that such a gear would require a series of clutch levers and speed regulating levers, which would have to be manipulated during the few seconds occupied for the stoking of each retort. Such gear would not have been sufficiently handy to compete with the flexibility obtainable with electric motor driving. However, by the unique application of two rope pulleys having adjustable diameters, in combination with a differential gear, as described below, all speeds, stop and reversing can be obtained by one handle, exactly as with an electric motor. Therefore this new patent gear may, with advantage, take the place of the electric motor of this type of stoking machinery.

One application of this patent gear to Messrs. Dempster's combined machine is shown in Fig. 1; and another, showing the general arrangement of the machine in a retort house, in Fig. 2. From these it will be seen that the gear consists of an endless cotton driving rope, arranged overhead down the length of the retort house, engaging with two expanding pulleys on the stoking machine. These pulleys are formed of cones, so inclined to one another as to give the correct slope for the best working of the rope, and are capable of adjustment while running, so as to increase or decrease their effective diameters by 25 per cent. One expanding pulley is connected to the other, that as one increases in diameter the other decreases in direct proportion, and *vice versa*. Consequently their speeds in revolutions per minute are variable in inverse ratio to their diameter.

The pulleys are directly connected to a differential nest of gearing, the feature of which is best explained by example. Assuming they are adjusted so as to be of equal effective diameters, the speeds will be equal in revolutions per minute. In this position neither speed nor power is transmitted to the machine countershaft, as the speed passed into the differential gear by one pulley is exactly extracted by the other. Assuming that the pulleys are readjusted to any intermediate position, the smaller one will run at an increased speed, while the larger one will run at a decreased rate. Consequently the lesser pulley feeds the differential gear faster than the greater one extracts it. The surplus speed will, therefore, pass onward from the differential gear to the countershaft of the machine, and the direction of rotation of this latter will be either in one direction or the other, according to which of the two pulleys was adjusted to be decreased in diameter.

Here, then, we have a mechanical gear which, with the driving rope running at a constant rate in one direction, permits – paradoxical though it may seem at first sight—of the machine being stopped, started, reversed, and the speed varied at will in either direction

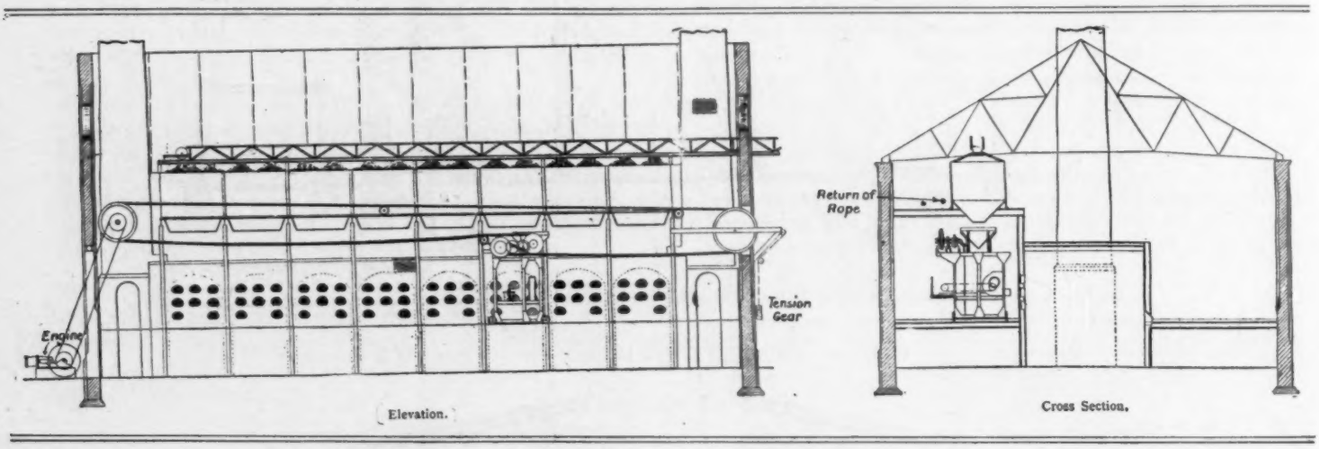


Fig. 1.—General Arrangement of Retort House with Combined Charging and Discharging Machine, Rope Driven.

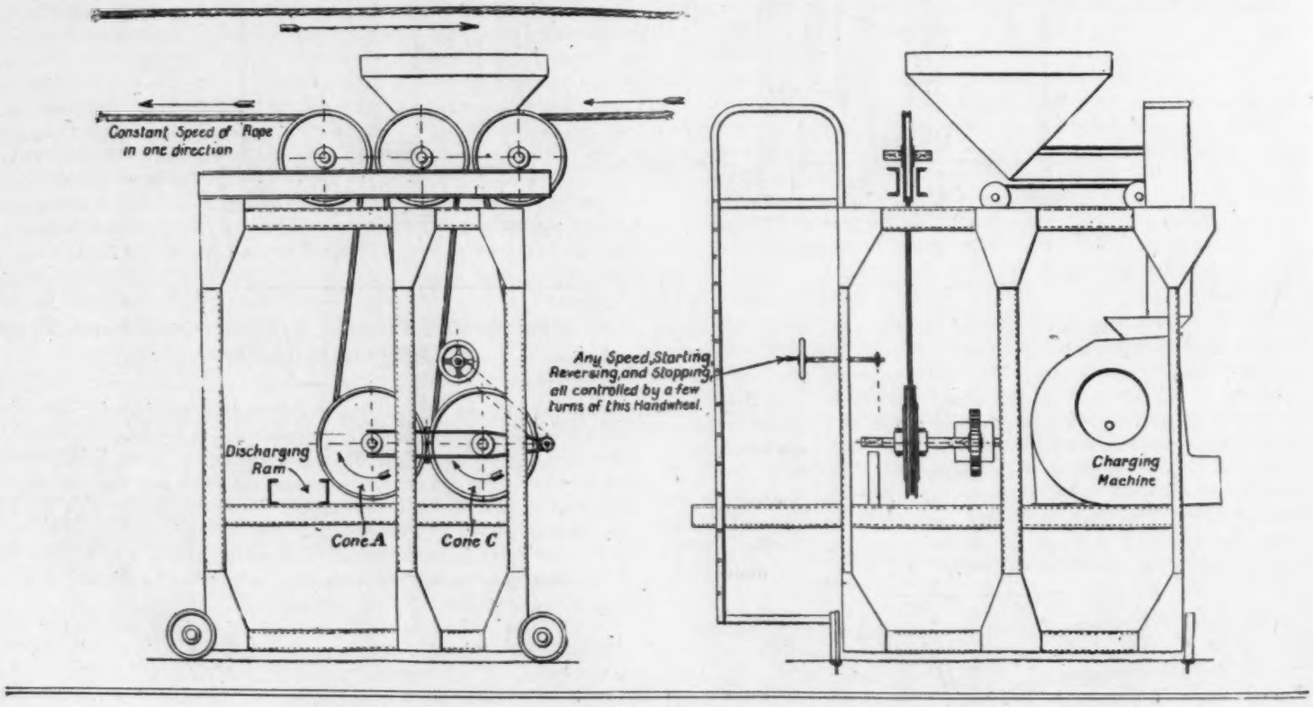
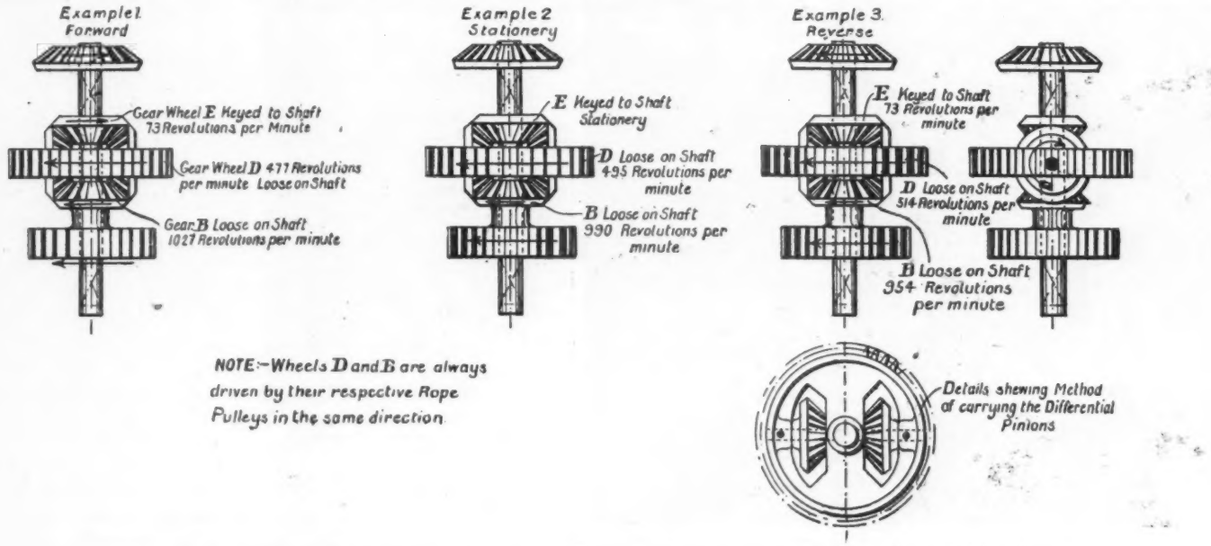
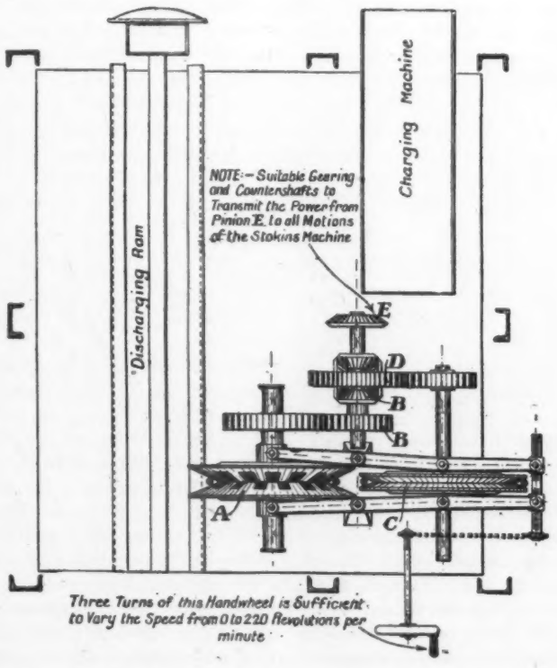

Constant Speed of Rope in one direction
Any Speed, Starting, Reversing, and Stopping, all controlled by a few turns of this Handwheel.
Discharging Ram
Cone A
Cone C
Charging Machine

Fig. 2.—Alternative Arrangement with Expanding Pulleys on a Rising and Falling Platform.

[Owing to there being two cones to adjust, the one balances the other; so that only a slight effort on the hand-wheel is sufficient to manipulate the grar.]



Revs. of Cone A.	Dia. of Cone A.	Revs. of Gear B.	Revs. of Cone C.	Dia. of Cone C.	Revs. of Gear D.	Revs. of Pinion E.	Direction.	
	Inches.			Inches.				
787	24	1112	630	30	445	222	Forward.	
756	25	1068	652	29	461	144	,,	
727	26	1027	675	28	477	73	,,	Example 1.
700	27	990	700	27	495	0	Zero.	Example 2.
675	28	954	727	26	514	73	Reverse.	Example 3.
652	29	922	756	25	534	144	,,	
630	30	890	787	24	557	222	,,	



gradually over the whole range, or any intermediate speed attained up to 360 revolutions per minute, all controlled by one handle, exactly as in the case of an electric motor. With this gear there are no sliding pinions nor clutches, and no slipping or loss of power takes place; moreover, there is no additional wear and tear over ordinary rope driving.

The advantages of such gear are obvious. Not only does it save the first cost of the electric installation, but, what is of more moment in gas works, the average fitter could easily understand and keep in working order something tangible, like a rope drive, whereas in the case of electric motors he is handicapped by the intricacies of the mechanism, especially when the darkness, as well as the dust, heat and dirt of a retort house are considered. Further, while the conditions are the worst possible for the working of electric motors, they cannot injuriously affect the rope drive. We, therefore, venture to think that most gas engineers will prefer to adopt a mechanical drive than introduce electricity into their works. It will be obvious that with this gear the gas or steam engine driving the rope should be arranged at one end of the retort house, so as to drive up to the countershaft carrying the driving rope pulley.

Deck Window Lighting.

In the last "Bulletin" issued by the Welsbach Company, of Gloucester, N. J., much space is given to "Show Window Illumination by the Reflex Light," and Editor Litle is to be complimented on the excellence of the style with which he put these matters before the industry. An example of show window lighting that seems to us well worth studying is that of a night view (12-minute exposure) of a deck window on the shops of Messrs. H. J. Holl & Co., who are operating a men's furnishing store in No. 102 South 11th street, Philadelphia. This seems to us, as Mr. Litle says it is, an excellent typical example of the methods of applying the Welsbach Company's "Reflex" lighting system to an inclosed or deck window. According to the "Bulletin's" description the panels in the deck are provided with a transparent or translucent glass. The practice in this case is to use ground glass, with the ground side down, and the lights are placed immediately above the center of the panel. In the installation in question, a very uniform lighting effect is produced. The lights are entirely concealed, and are so placed as to be accessible from the inside of the store, without in any way disturbing the window exhibit.

The diffusion of the light through the ground glass panels gives a very pleasing effect, and a little care in laying out the position and arranging for a proper distribution of the lamps, so as to light up the front of the window, has resulted in producing an exceedingly attractive display.

In this installation a feature is also incorporated for turning out the lights at a predetermined time, thereby avoiding the attention of the watchman and eliminating the possibility of neglect. This feature is receiving quite an extensive application in medium-sized and small installations, where a watchman is not employed.

Where the boxed window is built with wooden panels, and is lighted with electric bulbs placed inside, it is the practice to remove these wooden panels and replace them with ground glass, as was the case in the Holl installation. If the deck is put in especially for the installation of inverted lights, attention should be given to the size and position of the panels, based upon the number of lights necessary to produce the required number of foot-candles on the display. The

Fig. 1.—Night View—12-Minute Exposure.

position of the lights and the panels would also be determined in this calculation.

The gas supply pipe is brought up through the floor (Fig. 2) and branched to provide for a ¼ inch independent pilot system. The main

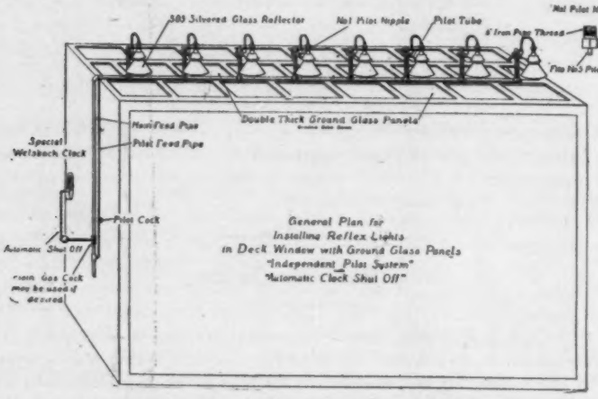


Fig. 2.—Plan of H. J. Holl & Co's. Window.

supply pipe is fitted with a ball-weighted cock which is attached to a special clock so arranged as to drop the ball at a predetermined time, and thereby shut off the gas.

Both the main supply and the pilot lines are run across the top of the deck, with parallel outlets, as shown in the plan. Each burner is provided with an independent shutoff cock for the gas supply and with pilot nipples (No. 1) for the regulation of the pilot lights.

Corporation Ordinances of New York, Relating to the Public Lamps.

SECTION 68. Any person breaking, mutilating, or obstructing any of the public lamps in the city of New York, shall be liable to a penalty of $5 for each offense.

SEC. 69. Any person who shall break, misplace or carry away any of the glass streets signs now or hereafter to be placed in any of the public lamps, shall be liable to a penalty of $3 for each offense.

SEC. 70. No person without permission of the Commissioner of Water Supply, Gas and Electricity, shall take up, remove or carry away any public lamp post in the city of New York, under the penalty of $10 for each offense.

SEC. 71. No person shall remove, or cause or permit to be removed, any public lamp post now or hereafter to be placed in front of their premises for the purpose of constructing a vault or otherwise, without the permission of the Bureau of Lamps and Gas; and the owner or owners of such vault shall cause the lamp posts so removed to be reset at their own expense immediately upon the completion of the vault, under the penalty of $25 for each offense.

SEC. 226. No person shall attach, place, or paste, or cause to be attached, placed, or pasted, any sign or advertisement, or other matter, upon any public lamp post, now erected in the city of New York or that may hereafter be so erected, under the penalty named in the next section.

SEC. 227. The violation of any of the provisions of the preceding section shall be punishable by a fine of not less than $1, or more than $10.

SEC. 412. It shall not be lawful to erect any telegraph post within a distance of 10 feet of any public street lamp. Any person offending against any of the provisions of this section shall be deemed guilty of a misdemeanor, and, on conviction thereof, before any of the police magistrates or justices of this city, shall be punished by a fine not exceeding $10, or in default of the payment of such fine, by imprisonment not exceeding 10 days.

SEC. 1953 of the New York City Consolidation Act of 1882. If any person shall wilfully break, take down, or carry away any glass lamp hung or fixed in any of the streets of the city of New York, or extinguish the lights therein, or by aiding or abetting in the same, shall be subject to a fine of $25, and in default of payment of such fine the offender shall be committed to the penitentiary for the term of 2 months.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

MR. W. H. VOLLUM, who since 1906 has been Superintendent of the North Penn (Pa.) Company, the works of which are located in Fort Washington, Pa., was recently elected Treasurer and Secretary of the Company. He will handle the local business of the Company there in the new office established on the gas plant at Fort Washington.

IN the ordinance recently adopted by the authorities of Cincinnati, O., which institutes the office of Inspector of Gas and Electric Meters it is provided that the salary of such official shall be $2,000 per annum, that his tenure of office shall be 1 year, or until removed by the Board of Public Service, and that the variation from accurate in electric meters allowed shall be 5 per cent., and in the case of gas meters 2 per cent. The fee for inspection of a gas meter is put at 25 cents, plus an amount, to be determined by the Inspector of Gas and Electric Meters, to cover the expense of making such test or inspection. The fee schedule for electric meters is:

Capacity					Amount.
10 amperes or less					$1.50
10	"	to 15 amperes			2.00
15	"	to 25	"		2.50
25	"	to 50	"		3.00
50	"	to 100	"		3.50
100	"	to 150	"		4.00
150	"	to 300	"		4.50
300	"	and over			5.00

It is decreed that the fees so deposited shall be paid into the city treasury to the credit of the city's general fund, provided that if the meters so examined be found incorrect, no fees or expenses shall be finally paid by the consumer, and the fees deposited shall be refunded and the Company shall furnish a new meter to the consumer without charge therefor. Otherwise the fees are to go to the general fund. Provided, further, that if it be necessary after the inspection of such meter to remove and disconnect the same, the Union Gas and Electric Company, or other Company owning such meter, shall immediately supply the consumer with another meter for use during the time required for such inspection.

THE Webb City and Carterville (Mo.) Gas Company recently elected the following Board of Directors: J. T. Lynn, George H. Bruen, Geo. R. Rigdon, R. C. Russum and Howard Gray. The Directors subsequently perfected the following organization: President, J. T. Lynn; Vice-President, Howard Gray, succeeding the late Col. James O'Neill; Secretary, Treasurer and General Manager, George H. Bruen.

THE Directors of the Massillon (O.) Gas and Electric Company have named the following executive management: President, H. L. Doherty; Vice-President, J. W. McClymonds; Secretary, W. E. Russell; Treasurer, R. R. Choate; Assistant Secretary and Treasurer, George Pearson.

THE report of Mr. Ellsworth Francisco, Inspector of Gas and Meters for Newark, N. J., covering the operations of his department for the 12 months ended December 31, 1907, is quite interesting. The Inspector declares that the average candle power of the gas supplied (average of 30 determinations) was 20.177 candles—at no time was the candle power below the statutory requirement. The highest pressure carried was 3.60 inches; the lowest, 1.90 inches; the average, 2.59 inches. Respecting the labelling of meters—the present one is of brass, bearing the words "Inspected by the city of Newark," the city coat of arms, the name of the inspector and date of test, the label being soldered across the line of opening on the meter cover. Mr. Francisco comments on this system and makes the following recommendations, "This form of label does not act as a seal, because it can be removed from the meter, be kept intact and be replaced without our knowledge. Under this system a meter is only tested once by the city during its lifetime in service. I have previously commenced the use of a seal made of red wax to be placed across the line of opening the meter on top. It should be protected by a metal ring soldered on the meter at the above named section, large enough to be readily discernible, and of suitable thickness to bear a stamp impression. In my opinion this is the best and most protective method that can be used, because it insures that the gas company must have all meters that it removes for repairs retested and sealed, the wax being absolutely destroyed when the meter is opened." The total number of meters tested during the year was 4,066—of these 3,381 were of the 5-light order. Only 48 were found incorrect, and the average over all of these was 2.3 per cent. fast. He declares that the law of 1875, under which the City Gas Inspection Department is acting, requires amending to make it more effective, and to cause the same to correspond nearer to the provisions of those ruling in other progressive places. He recommends raising the legal standard of minimum candle power from 14 to 20. It is further recommended that the fees of $1.50 charged consumers for testing a meter complained of should be reduced to 50 cents in the case of the smaller meters ordinarily used, $1 for 45, 60 80 and 100-light meters, and $1.50 for meters of larger capacity. The Inspector also recommends that in place of the present indefinite time limit gas companies should be required to remove meters complained of within 48 hours of receiving notice from the City Gas Inspector.

THE State Board of Gas and Electric Light Commissioners has notified the Salem (Mass.) Gas Light Company that it may have until the 1st prox. to formally accept the recommendation that the selling rate for gas be put at the rate named by the Commissioners—$1.10 per 1,000 cubic feet.

THE reports by the Tacoma (Wash.) Gas Light Company, for the month of January last, as compared with January, 1907, show a gain in net earnings of $2,689. The increase in gross was $3,545.

"W.," WRITING onder date of the 9th inst., forwards the following: "The substantial prosperity of the textile industries is emphasized by the fact that the White Oak Mills, controlled by the Proximity Manufacturing Company, of Greensboro, N. C., has lately entered its third order with the Green Fuel Economizer Company for an equipment of economizers. These mills constitute the largest denim mills in the world, employing 1,300 operatives and working up about 145 bales of cotton per day on the average. The buildings are of the latest improved construction, with sawtooth roofs to afford good lighting, together with modern improvements and machinery. Some of the machines do the work for which 12 employees are required at other mills. Not only is this the third order for Green economizers from the White Oak Mills, but in addition the owners have bought a Green economizer for the Proximity Mills, two for the Mineola Mills and two for the Revolution Mills, making a total equipment of 8,000-horse power.

WE understand that plans are maturing in the Executive Committee of the Schenectady (N. Y.) Illuminating Company to vacate the Dock street plant which it now jointly uses with the Schenectady Railway Company as a transforming station, with the occupying of new and larger quarters, to be built on the present site of the Mohawk gas works on South Center street, which will be moved to the new gas plant on Villa Road, near the gasholder now in course of construction.

THE proprietors of the Kewanee (Ills.) Light and Power Company have put the gross selling rate at $1.40 per 1,000 cubic feet, prompt payment (within 15 days) to entitle the purchaser to a rebate of 10 per cent.

THE Water, Light and Gas Company, of Hutchinson, Kas., has shut down the manufacture of gas, and hereafter natural gas will be distributed through its mains.

A BILL introduced in the Ohio Assembly, by Representative Marion G. Foster, provides that gas companies are prohibited from requiring a cash deposit from any person who can furnish security for a 50 days' estimated use. Further, that in no event can gas companies require a cash deposit exceeding the sum of $5, on which deposit companies must pay interest at the rate of 4 per cent. per annum.

THE Beatrice (Neb.) Gas and Power Company, which has been in operation there for 6 months or more, has secured about all that is left of the concern known as the City Gas Company, which has been in the hands of a receiver—Mr. H. G. Riessen—for some months.

THE annual meeting of the Macon (Ga.) Gas Light and Water Company was held the 4th inst. The officers chosen were: Directors, A. E. Boardman, P. J. Jennings, Stewart Wood, W. G. Solomon, Walter Wood, H. T. Powell and J. H. Felton; President, H. T. Powell; Treasurer, Stewart Wood; Secretary, W. G. Solomon; General Manager, A. C. Blinn.

THE Shippensburg (Pa.) Light, Heat and Power Company has been authorized to extend its system to the outlying district of Newville.

THE reports of the Wilkes-Barre (Pa.) Gas and Electric Company show an increase of 20 per cent. in net earnings for the 12 months—this on a 6 figure amount, too.

THE Pawtucket (R. I.) Gas Company has petitioned the Town Council for the right to pipe the outlying district of Cumberland Hill.

MR. C. W. KOINER, for some time Manager of the Los Angeles (Cal.) Gas and Electric Company, has been appointed Superintendent of Street Lighting by the Los Angeles city council.

THE Gas Bench Construction Company, of St. Louis, Mo., has recently been awarded contracts for bench work in the following places: De Kalb, Ills., Columbia, Mo., Lansing, Mich., Millville, N. J., Michigan City, Ind., Painesville, O., and Sterling, Ills. All of the work is to be constructed according to the Company's latest designs for half-depth benches of 6's.

ADVICES from Boston, Mass., are to the effect that after July 1, 1908, the Massachusetts Gas Companies will take 25,000 tons instead of 50,000 tons monthly from the Dominion Coal Company.

THE City Council of Corpus Christi, Tex., has granted to R. H. Pattison and associates a franchise for the operation of a gas works.

THE additions to the generating division of the Lyons (N. Y.) Light Company's plant will increase its outputting ability at least 40 per cent.

THE Mitchell Illuminating and Power Company is arranging to take over the plant and franchises of the Mitchell (S. D.) Gas Company, which was placed in the hands of a receiver last fall, at the time that C. C. King, a banker who was largely interested in its fortunes, was obliged to suspend. Those who are taking it over have determined to put the plant in first-class shape.

A SYNDICATE has purchased the plant of the Atlantic (Ia.) Gas and Fuel Company, the purpose being to combine it with the properties of the local electric lighting enterprise.

WE regret very much to have to chronicle the serious illness of Councilman John McManus, Secretary and Treasurer of the Buffalo Natural Gas Fuel Company.

THE Electric Gas Company, of America, the concern with which the celebrated Mr. B. Van Steenbergh, of Goshen, N. Y., and elsewhere, is prominently connected, and with which General John P. Harbison has had no connection whatever, for some months, is busily engaged trying to float stock. As an attractor, the purchaser of 4 shares at par is given a bonus in the shape of a $100 bond of the Butler (N. J.) Gas Lighting and Heating Company. Such a bonus!

THE AMERICAN GAS LIGHT JOURNAL

A. M. CALLENDER & CO.,
PROPRIETORS.

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ELBERT P. CALLENDER,
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NOTIFICATION RESPECTING ADVERTISING.

Orders for new advertising, or for changes in standing advertisements, to insure attention in the issue following their reception, must be in hand any time of Wednesday.

AGENTS:

New York—American News Company, 39 and 41 Chambers street.
Germany—Lemcke & Buechner, of New York.
England—Aug. Siegle, 30 Lime street, London.

MONDAY, MARCH 16, 1908.

The Market for Gas Securities.

The buoyancy of the general list carried Consolidated along with the rest last week, the shares selling at a good fraction above par yesterday. To-day (Friday) the opening quotations were 100 to 101. Very little stock is offering. Judge Hough's action on certain valuations (notably in the instance of real estate and franchise appraisings) complained of by attorneys for the State, given in Master Masten's findings, is in line with everything so far recorded in the 80-cent contest.

Peoples, of Chicago, continues upward and Massachusetts Gas Companies also feels the impulse of inquiry. The bond market is considerably better.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

16 WALL STREET, NEW YORK CITY.

MARCH 16.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share:

N. Y. City Companies.	*Capital.*	*Par.*	*Bid*	*Asked.*
Consolidated	$73,177,000	100	99	101
Central Union Gas Co.—				
1st 5's, due 1913, J. & J.	3,000,000	1,000	92	97
Equitable Gas Light Co.—				
Con. 5's, due 1932, M. & S.	1,000,000	1,000	—	105
Mutual	3,500,000	100	—	170
New Amsterdam Gas Co.—				
1st Con. 5's, due 1948, J. & J.	11,000,000	1,000	84	86
New York & Richmond Gas Co. (Staten Island)	1,500,000	100	37	43
1st Mtg. Gold Bds. 5 p. ct.	1,000,000	—	98	104
Northern Union—				
1st 5's, due 1927, J. & J.	1,250,000	1,000	90	96
New York and East River—				
1st 5's, due 1944, J. & J.	3,500,000	1,000	100	105
Con. 5's, due 1945, J. & J.	1,500,000	—	97	101
Standard	5,000,000	100	70	100
Preferred	5,000,000	100	100	125
1st Mtg. 5's, due 1930, M. & N.	1,500,000	1,000	100	105
The Brooklyn Union	15,000,000	1,000	90	100
1st Con. 5's, due 1948, M. & N.	15,000,000	—	91¾	92
Yonkers	299,650	500	130	—
Out-of-Town Companies				
Bay State	50,000,000	50	1	1 1-16
" Income Bonds	2,000,000	1,000	—	75
Binghampton Gas Works	450,000	100	—	65
" 1st Mtg. 5's	500,000	1,000	95	100
Boston United Gas Co.—				
1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	5	8
" " Bonds, 5's	5,250,000	1,000	63	66
Capital, Sacramento	500,000	50	—	35
Bonds (6's)	150,000	1,000	—	—
Chicago Gas Co. Guaranteed Gold Bonds	7,000,000	1,000	104	105¼
Cincinnati Gas and Electric Co.	20,500,000	100	91	99½
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	92	98
Columbus (O.) Gas Lt. & Heating Co.	1,682,750	100	87	88
Preferred	3,026,500	100	81	82
Consumers, Toronto	2,000,000	50	200	204
Consolidated, Baltimore	11,000,000	100	—	105
Mortgages, 6's	3,000,000	—	—	118
Chesapeake, 1st 6's	1,000,000	—	—	—
Equitable, 1st 6's	910,000	—	—	—
Consolidated, 1st 5's	1,490,000	—	—	112
Consolidated Gas Co. of N. J.	1,000,000	100	15	17
Con. Mtg. 5's	880,000	1,000	92	95
Bonds	75,000	—	—	100
Detroit City Gas Co.	6,000,000	50	—	50
" Prior Lien 5's	4,618,000	1,000	—	98
Detroit Gas Co., 5's	381,000	1,000	75	80
" Inc. 5's	16,000	100	98½	100
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	—	101
Essex and Hudson Gas Co.	6,500,000	—	39	40
Fort Wayne	2,000,000	—	—	—
" Bonds	2,000,000	—	55	—
Grand Rapids Gas Lt. Co., 1st Mtg. 5's	1,225,000	1,000	104½	105
Hartford	750,000	25	190	200
Hudson County Gas Co., of New Jersey	10,500,000	—	100	105
" Bonds, 5's	10,000,000	—	101	102½
Indianapolis	2,000,000	—	60	70
" Bonds, 5's	2,650,000	—	104½	105
Jackson Gas Co.	250,000	10	82	—
" 1st Mtg. 5's	250,000	1,000	97	100
Kansas City Gas Light Co., of Missouri	5,000,000	100	—	36
Bonds, 1st 5's	3,822,000	1,000	102	104
Laclede, St. Louis	10,000,000	100	97	97¼
Preferred	2,500,000	100	92¾	93
Bonds	10,000,000	1,000	104	104¼
Lafayette Gas Co., Ind.	1,000,000	100	—	60
Bonds	1,000,000	1,000	60	65
Louisville	2,470,000	50	143	145
Madison Gas & Elec. Co. " 1st Mtg. 6's	350,000	1,000	106	108¾
" 6 per cent. scrip, due 1910	100,000	25	60	60¼
Massachusetts Gas Companies, of Boston	25,000,000	100	52	—
Preferred	25,000,000	100	83	—
Montreal, Canada	2,000,000	100	214	216¾
Nashville Gas Lt. Co.	1,000,000	100	110	—
Newark, N. J., Con. Gas Co.	6,000,000	—	56	58
Bonds, 6's	6,000,000	—	137	138
New Haven	2,000,000	25	200	—
Peoples Gas Lt. & Coke Co., Chicago	25,000,000	100	87¾	88
1st Mortgage	20,100,000	1,000	—	—
2d "	2,500,000	1,000	104	—
Rochester Gas & Elec. Co.	2,120,000	50	88	—
Preferred	2,150,000	50	118	—
Consolidated 5's	2,000,000	—	104¾	105¼
San Francisco, Cal.	15,500,000	—	—	—
St. Joseph Gas Co.—				
1st Mtg. 5's	751,000	1,000	92	—
St. Paul Gas Light Co.	1,500,000	100	45	47
1st Mortgages, 6's	650,000	1,000	113	116
Extension, 6's	600,000	1,000	112½	115
General Mortgage, 5's	2,465,000	1,000	96¼	—
Syracuse, N. Y.	1,375,000	100	50	55
Bonds	2,047,000	1,000	102	—
Washington, D. C.	2,800,000	20	288	300
1st Mortgage, 6's	600,000	—	—	—
Western, Milwaukee	4,000,000	—	—	—
Wilmington, Del.	600,000	50	230	—

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DIVIDEND NOTICE.

OFFICE OF THE UNITED GAS IMPROVEMENT CO., N. W. CORNER BROAD AND ARCH STS., PHILADELPHIA, PA., March 11, 1908.

The Directors have this day declared a quarterly dividend of 2 per cent. (one dollar per share), payable April 15th, 1908, to stockholders of record at the close of business, March 31, 1908. Checks will be mailed.

1710-5 LEWIS LILLIE, Treasurer.

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By a Water Gas Maker

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POSITION WANTED.

First-class meter repairer in every respect. Good references regarding ability and reliability. Capable of running a shop.

1710-1 Address, "P. E.," care this Journal.

Position Wanted

By thorough, experienced manager of gas, electric or combination property. Experienced in all branches of gas and electric manufacture and distribution work, together with ability in up-to-date new business methods. Experience in rebuilding and construction engineering. Will be open for engagement after April 1. Correspondence solicited. Good references. Address,

1709-4 "J. S. D.," care this Journal.

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1710-2 Care this Journal.

WANTED.

An old established gas appliance house in the East would like to arrange with a Western house to act as their sales' agent. References exchanged. Address,

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WANTED, FOR SOUTHERN PLANT,

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Experienced Gas Stove Solicitor,

For few months. State experience and salary wanted.

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We want a sober, reliable man, who understands the operation of water gas apparatus, and who can do gasfitting well. Daily output 30,000. Steady work for the right man.

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WANTED,

One Good Second-hand 6-inch or 8-inch Gas Exhauster Complete.

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Made by Western Gas Construction Co. Used only a short time. For particulars write the

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ELMIRA WATER, LIGHT AND RAILROAD CO.,

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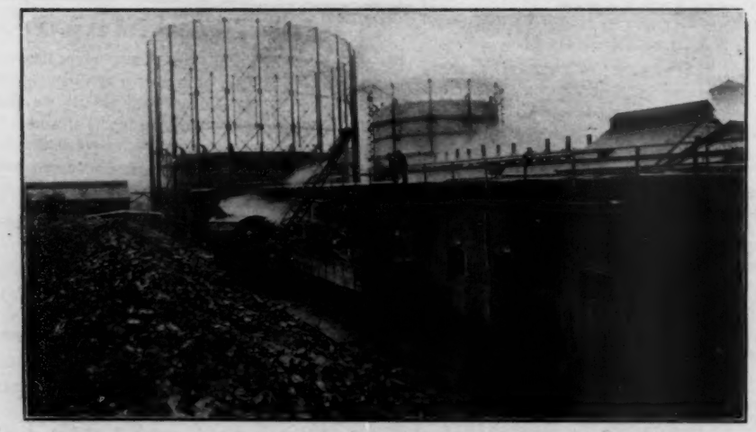

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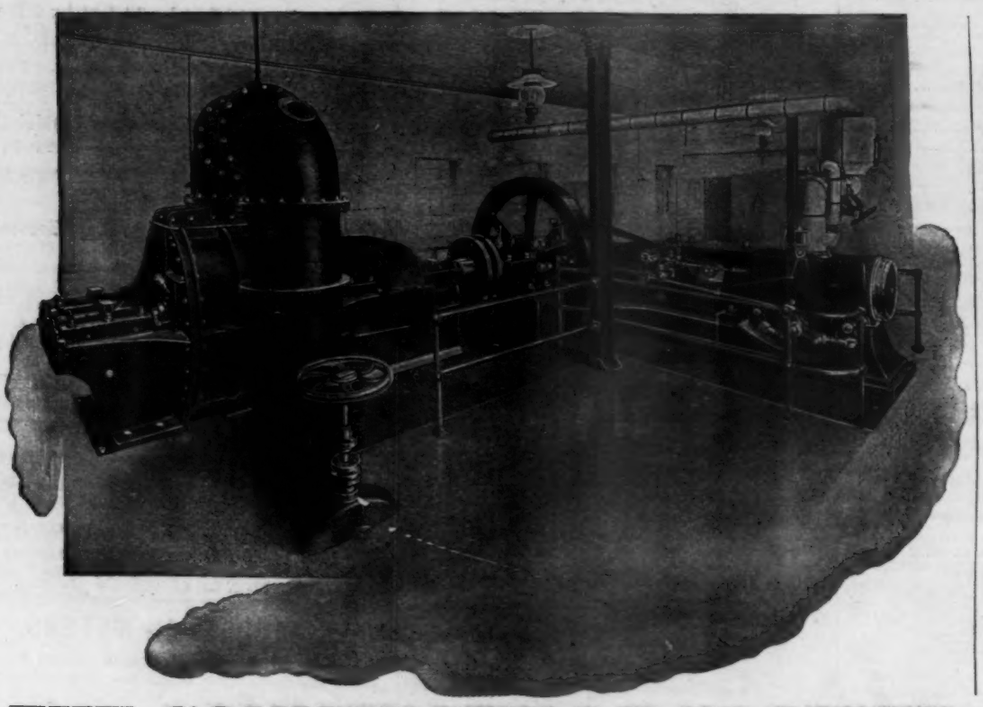

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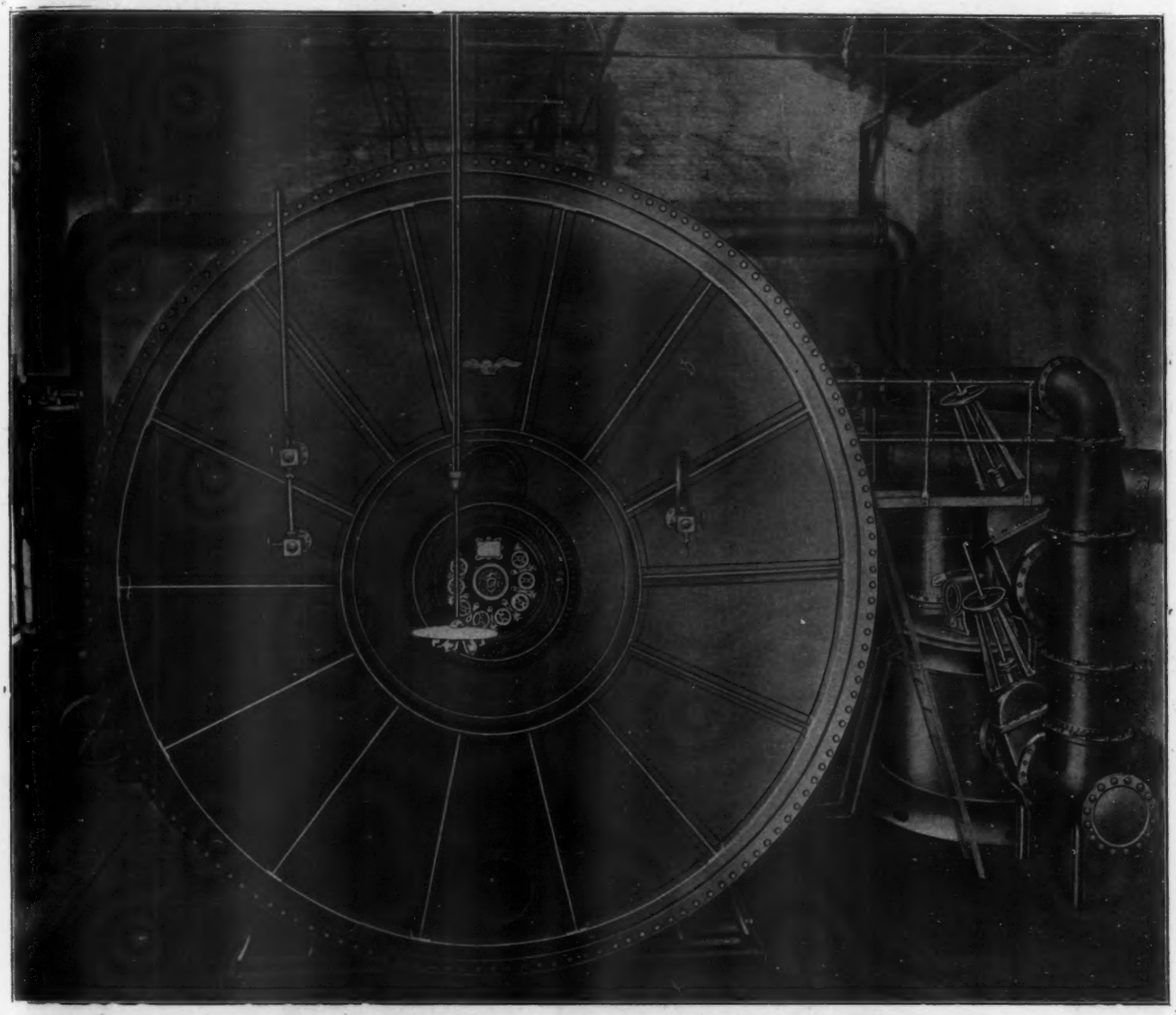

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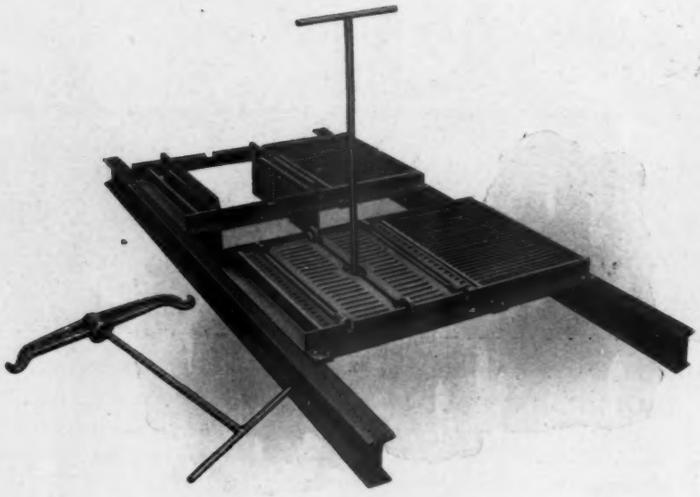

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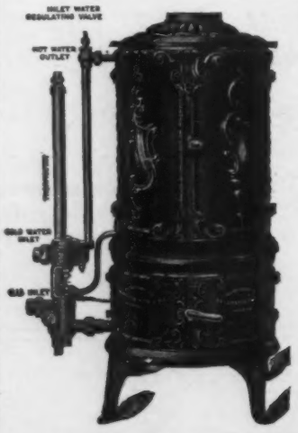

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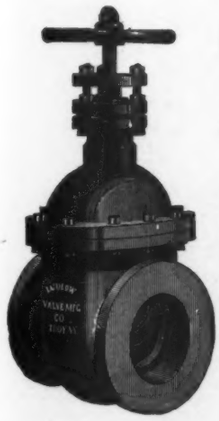

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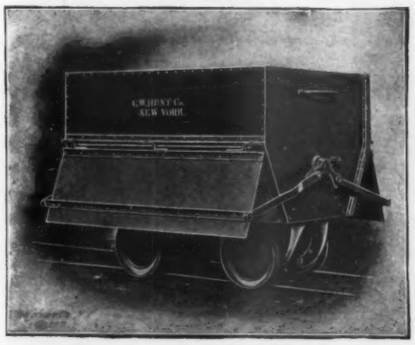

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THE ILLUSTRATIONS SHOW THE DOORS OF THE CAR BOTH OPEN AND CLOSED.

We have designed and built a large variety of cars for handling coke, and illustrations, showing some of the different types, are given in Bulletin A.I. A copy will be mailed to any Gas Engineer mentioning this paper.

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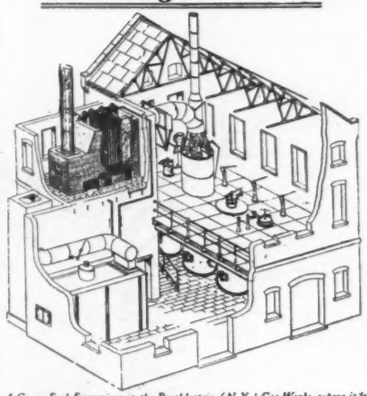
How to Save 15% of the Coal in Making Water Gas



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(Sole Builders of the Green Fuel Economizer in this Country)

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It describes the Green Air Heater and the Green Fuel Economizer, by means of which you can save 15 per cent. of the generator fuel, 25 per cent of the boiler coal, and a considerable part of the oil bill, in making water gas. It describes plants now in actual operation and gives lay-outs and details which will enable you to form a good idea of how the apparatus should be applied.

The stack valve gases from a gas generator usually escape at from 1,500° to 1,800° F. After passing them through the Green Air Heater to heat the blast they will still have a temperature of 800° F., which is higher than the usual temperature of flue gases from boilers. They may, therefore, still be used to heat water for the boiler, and will thus save 20 per cent. of the boiler coal. On this basis, a plant making 5,000,000 cubic feet of gas per month will save nearly $2,500 per year on a total investment of $3,500.

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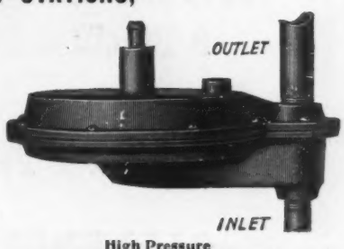

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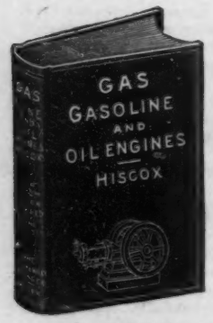

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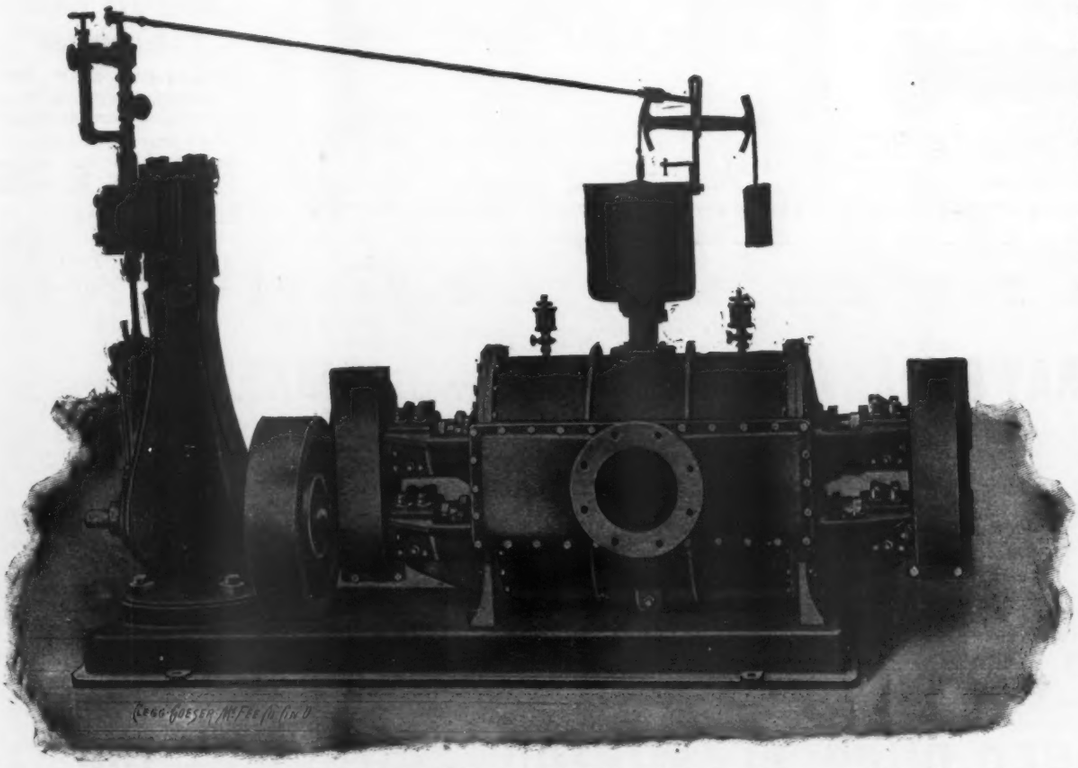

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Photometrical and Experimental Apparatus.

PUBLIC LIGHTING TABLE.

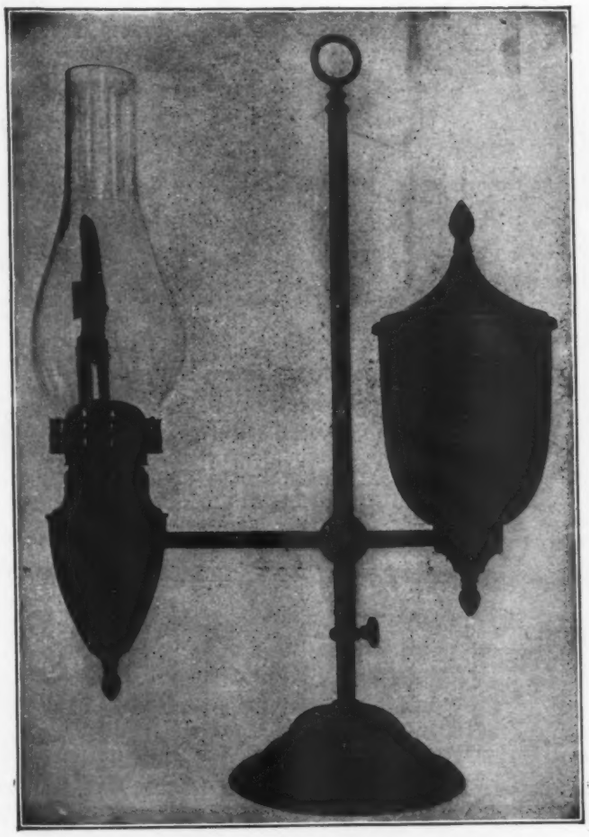
APRIL, 1908.

Day of Week.	Table No. 1. Following the Moon. Date.	Light.	Extinguish.
Wed.	1	6.50 PM	4.40 AM
Thu.	2	6.50	4.40
Fri.	3	6.50	4.40
Sat.	4	6.50	4.40
Sun.	5	10.30	4.30
Mon.	6	11.20	4.30
Tue.	7	12 20 AM	4.30
Wed.	8	1.00 FQ	4.30
Thu.	9	1.40	4.30
Fri.	10	2.20	4.30
Sat.	11	2.50	4.30
Sun.	12	3.20	4.30
Mon.	13	3.50	4.30
Tue.	14	4.10	4.30
Wed.	15	No L.	No L.
Thu.	16	No L FM	No L.
Fri.	17	No L.	No L.
Sat.	18	7.10 PM	10.00 PM
Sun.	19	7.10	11.00
Mon.	20	7.10	12.10 AM
Tue.	21	7.10	1.10
Wed.	22	7.10	2.10
Thu.	23	7.10 LQ	3.00
Fri.	24	7.10	3.40
Sat.	25	7.10	4.00
Sun.	26	7.20	4.00
Mon.	27	7.20	4.00
Tue.	28	7.20	4.00
Wed.	29	7.20	4.00
Thu.	30	7.20 NM	4.00

TOTAL HOURS DURING 1908.

By Table No. 1.

	Hrs. Min.
January	228.30
February	187.30
March	192.00
April	160.10
May	155.10
June	138.00
July	155.50
August	173.40
September	185.20
October	214.00
November	218.10
December	226.40
Total, yr.	2235.00



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***

10-Candle Power.

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This lamp is a perfect substitute for the 10-candle Pentane Lamp hitherto used, and has the following advantages:

1st. It uses Standard Kerosene Oil (Pratt's Astral Oil or equivalent).

2d. It is remarkably steady. Will burn 24 hours continuously with less than 2 per cent. variation.

3d. It is much less dangerous than Pentane, which is a kind of gasolene.

4th. It is not easily affected by air currents in the photometer room.

5th. Since the lamp may burn continuously, the candle power of gas may be taken at any moment, if necessary. This insures steady illuminating power without waste of carburetting material.

6th. The first cost of the lamp brings it within the reach of even small gas works.

7th. Costs much less to maintain than a Pentane lamp or sperm candles doing the same service.

8th. Is not affected by the weather.

PUBLIC LIGHTING TABLE.

APRIL, 1908.

Day of Week.	Table No. 2. New York City. All Night Lighting. Date.	Complete Lighting in One Hour From Time Given P. M.	Complete Extinguishing in 50 Minutes From Time Given A. M.
Wed.	1	5.57	4.47
Thu.	2	6 07	4.37
Fri.	3	6.07	4.37
Sat.	4	6 07	4.37
Sun.	5	6 07	4.37
Mon.	6	6.07	4.32
Tue.	7	6.07	4.32
Wed.	8	6.07	4.32
Thu.	9	6.17	4.22
Fri.	10	6.17	4.22
Sat.	11	6.17	4.22
Sun.	12	6.17	4.22
Mon.	13	6.17	4.22
Tue.	14	6.17	4.22
Wed.	15	6.17	4.22
Thu.	16	6.27	4.17
Fri.	17	6 27	4 17
Sat.	18	6.27	4.17
Sun.	19	6 27	4.12
Mon.	20	6.27	4.12
Tue.	21	6 27	4.12
Wed.	22	6.27	4.12
Thu.	23	6.37	4.02
Fri.	24	6.37	4.02
Sat.	25	6.37	4.02
Sun.	26	6.37	4.02
Mon.	27	6.37	4 02
Tue.	28	6.37	4.02
Wed.	29	6.37	4.02
Thu.	30	6.47	3.52

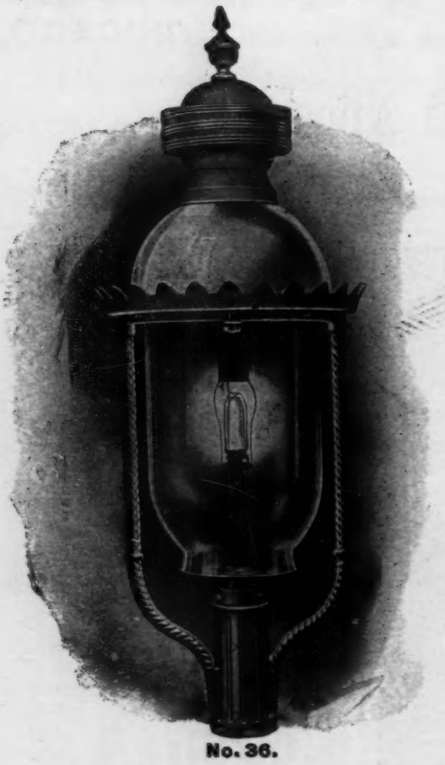
TOTAL HOURS DURING 1908.

	Hrs. Min.
January	481.50
February	329.15
March	351.50
April	341.50
May	233.05
June	218.10
July	282.55
August	254.55
September	292.25
October	420.45
November	374.30
December	411.05
	3992.35
Deduct on account of 50 min. extinguish'ng time	30.30
Total, yr.	3962.05

NEW YORK, 318 West 42d Street. BOSTON, 820 Beacon Building. PHILADELPHIA, Broad and Arch Streets. ST. LOUIS, 712 Roe Building. CHICAGO, 218 La Salle Street. SAN FRANCISCO, 512 Oak Street.

WELSBACH STREET LIGHTING COMPANY

....OF AMERICA....



No. 36.

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Package Contains 16 Dozen.

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Mexico, Mo.
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Holyoke, Mass.
Peoria, Ills.
Schenectady, N. Y. (2d contract).
Danbury, Conn.
Galveston, Tex. (2d contract).
Quebec, Canada.
Indianapolis, Ind. (2d contract).
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Waterbury, Conn. (5th contract).
Sioux Falls, S. D. (3d contract).
Philadelphia, Pa.
New Hartford, Conn.
Poughkeepsie, N.Y. (2d contract).
Nashville, Tenn.
Salisbury, Md.
Norfold, Va. (4th contract).
Wallingford, Conn.
Richmond, Va. (2d contract).
Oak Bluffs, Mass.
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TOTAL SETS INSTALLED DURING YEAR, ... 43
TOTAL SETS INSTALLED TO DECEMBER 31, 1907, ... 677
TOTAL DAILY CAPACITY, TO DECEMBER 31, 1907, ... 545,865,000 cu. ft.

Tar Extractors for Carburetted Water Gas.
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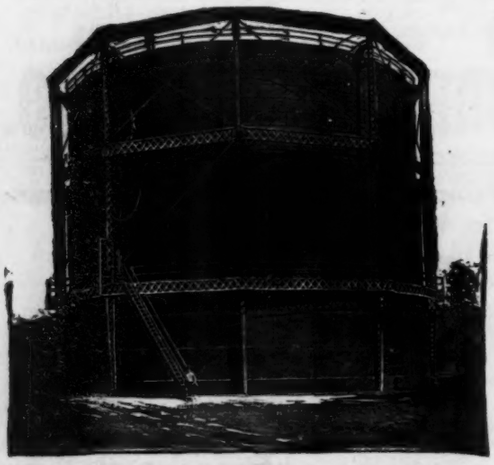

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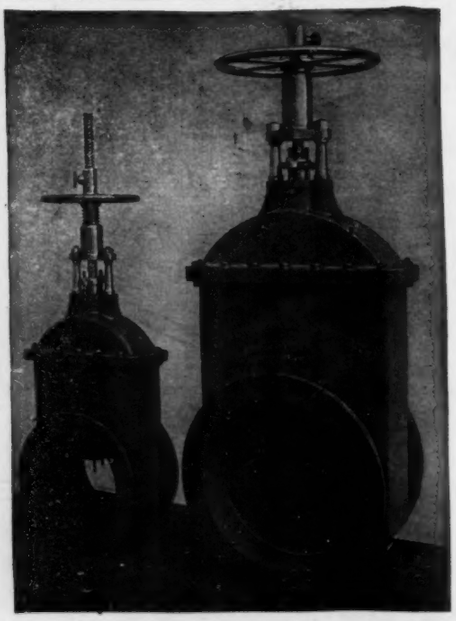

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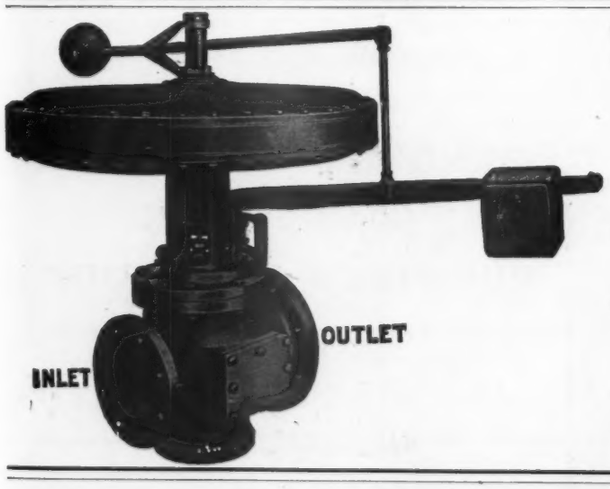

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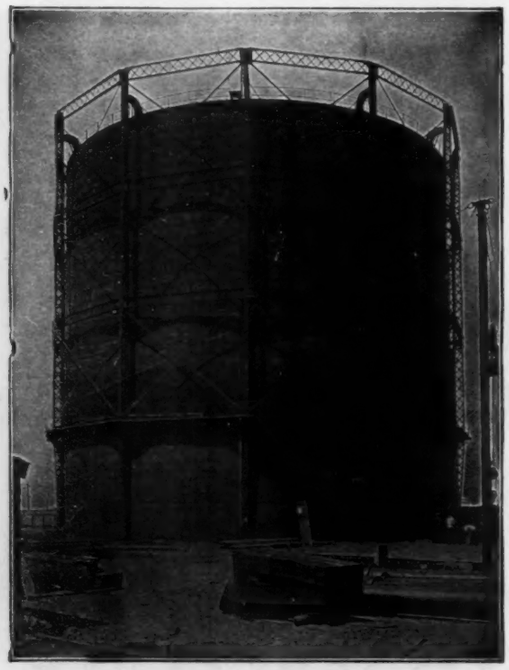

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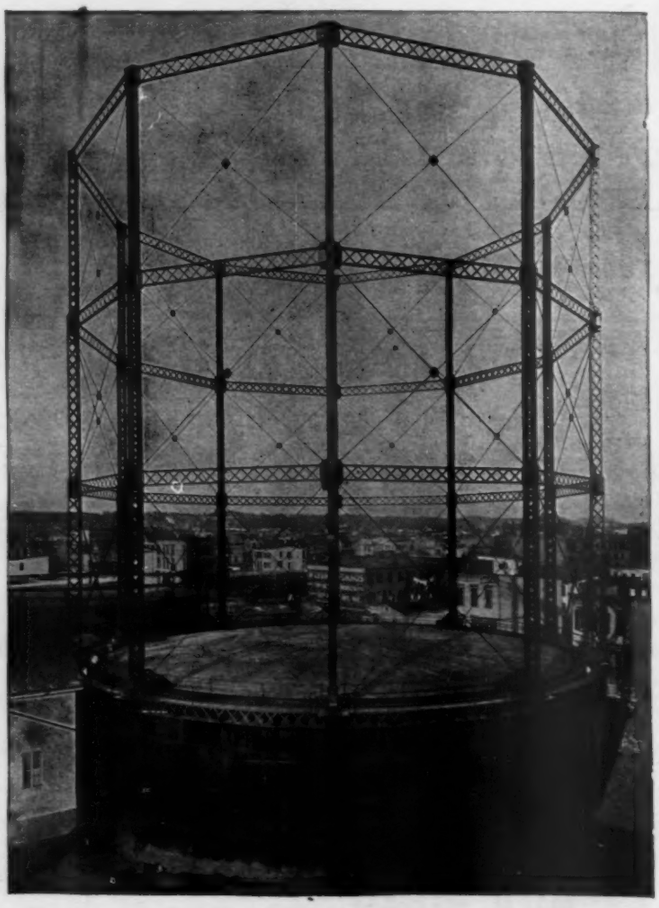

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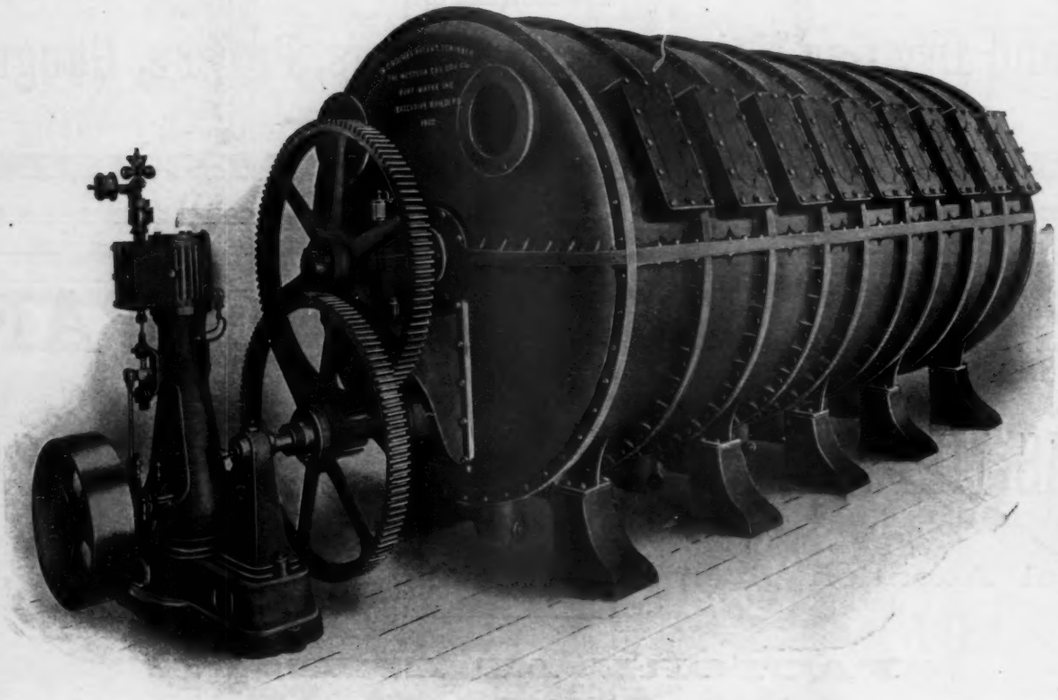

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